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# Queens-Manhattan Transit Improvements Study

***Final Report***

**August 1991**

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**UMTA TECHNICAL ASSISTANCE PROGRAM**

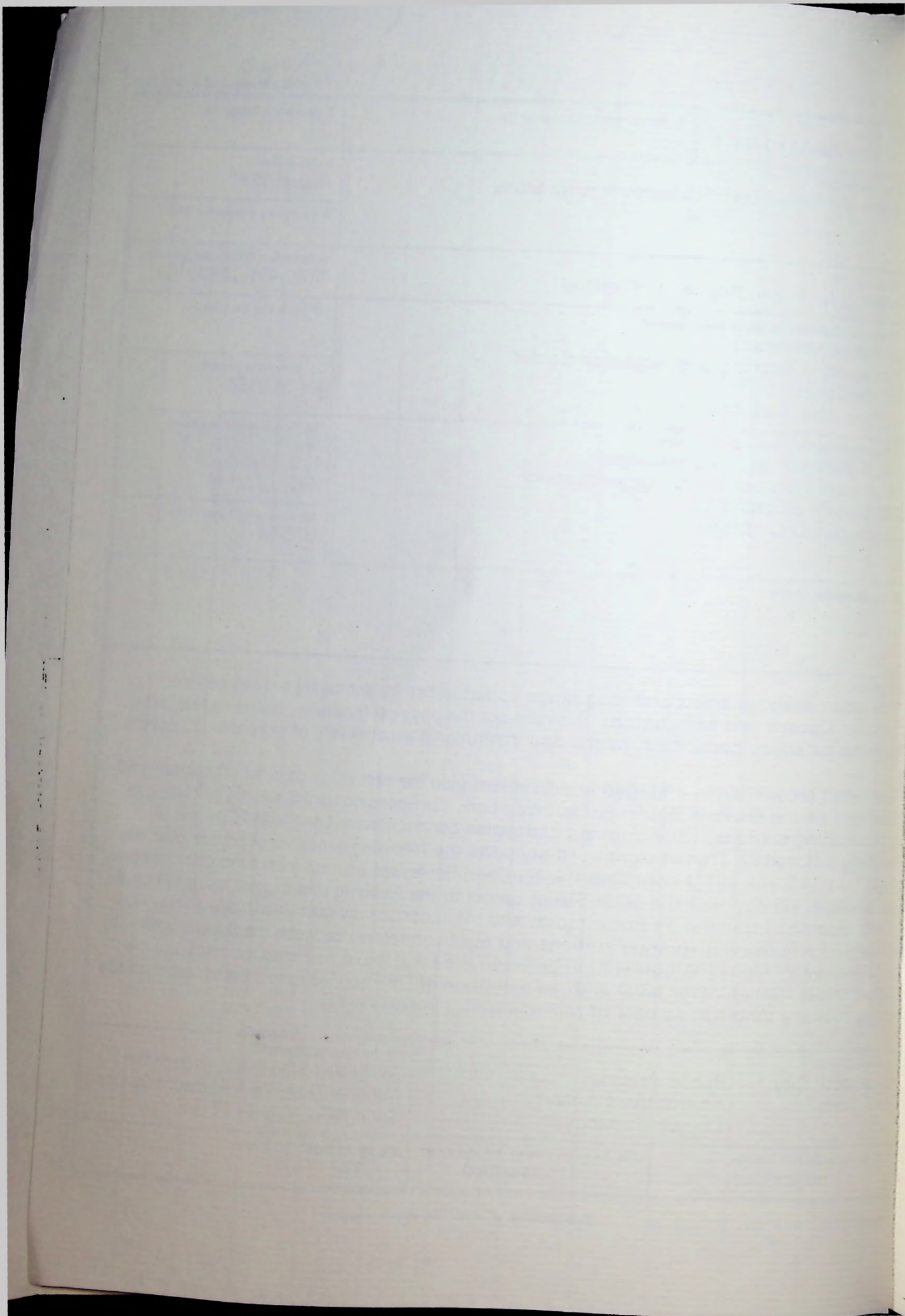
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| 16. Abstract<br>This report analyzes short and long range opportunities for improving subway service between Queens and Manhattan. It evaluates the physical feasibility, operating feasibility, ridership potential, capacities, costs, and institutional acceptability of more than 20 options. The report recommends a staged improvement plan the first stage calls for (1) operating 60-foot cars on the Queens Boulevard subway Line, (2) Speeding up J-Z service by closing or consolidating stations, (3) improving pedestrian connections in Long Island City and (4) building a Rosedale Transit Center. It supports the following sequence of actions over the next 10 to 15 years; (1) complete the Northern Boulevard express-local connection as soon as possible, (2) connect the 60th Street tunnel to the Flushing Line express track, (3) utilize a car capable of running on both tracks, and (4) subsequently (as needed) add a fifth track through the Roosevelt Avenue stations and build connection between the Queens Boulevard and Rockaway Lines. A connection between the Long Island Rail Road main line and the 63rd Street tunnel lower level with an extension of LIRR service to midtown Manhattan has merit over the long run as part of regional transit improvements. |                                                      |                                                                                                                                              |           |
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# METRIC CONVERSION FACTORS

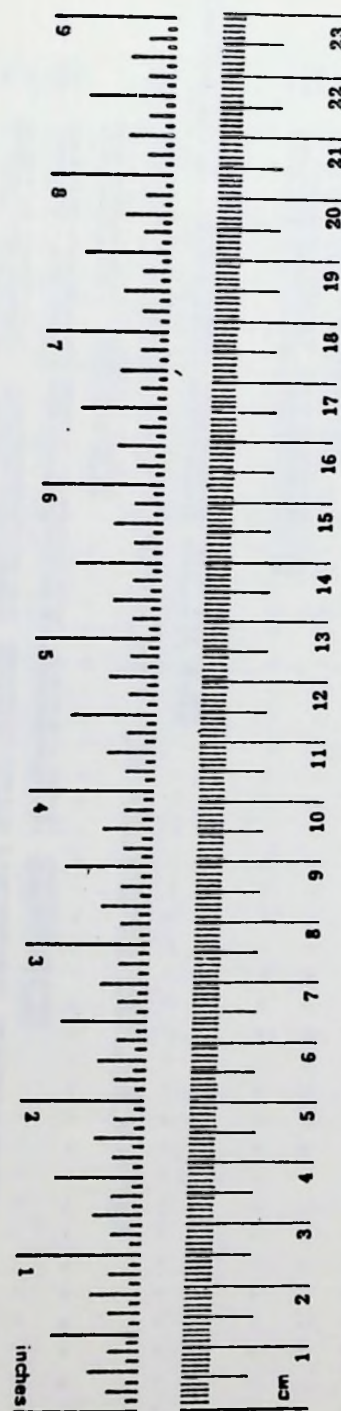
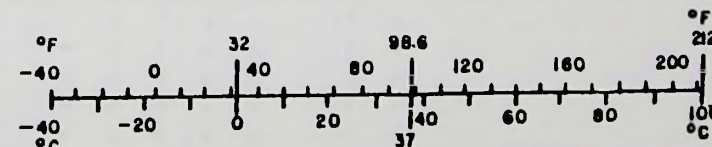
## Approximate Conversions to Metric Measures

| Symbol                     | When You Know          | Multiply by                | To Find             | Symbol          |
|----------------------------|------------------------|----------------------------|---------------------|-----------------|
| <b>LENGTH</b>              |                        |                            |                     |                 |
| in                         | inches                 | 2.5                        | centimeters         | cm              |
| ft                         | feet                   | 30                         | centimeters         | cm              |
| yd                         | yards                  | 0.9                        | meters              | m               |
| mi                         | miles                  | 1.6                        | kilometers          | km              |
| <b>AREA</b>                |                        |                            |                     |                 |
| in <sup>2</sup>            | square inches          | 6.5                        | square centimeters  | cm <sup>2</sup> |
| ft <sup>2</sup>            | square feet            | 0.09                       | square meters       | m <sup>2</sup>  |
| yd <sup>2</sup>            | square yards           | 0.8                        | square meters       | m <sup>2</sup>  |
| mi <sup>2</sup>            | square miles           | 2.6                        | square kilometers   | km <sup>2</sup> |
|                            | acres                  | 0.4                        | hectares            | ha              |
| <b>MASS (weight)</b>       |                        |                            |                     |                 |
| oz                         | ounces                 | 28                         | grams               | g               |
| lb                         | pounds                 | 0.45                       | kilograms           | kg              |
|                            | short tons (2000 lb)   | 0.9                        | tonnes              | t               |
| <b>VOLUME</b>              |                        |                            |                     |                 |
| tsp                        | teaspoons              | 5                          | milliliters         | ml              |
| Tbsp                       | tablespoons            | 15                         | milliliters         | ml              |
| fl oz                      | fluid ounces           | 30                         | milliliters         | ml              |
| c                          | cups                   | 0.24                       | liters              | l               |
| pt                         | pints                  | 0.47                       | liters              | l               |
| qt                         | quarts                 | 0.95                       | liters              | l               |
| gal                        | gallons                | 3.8                        | liters              | l               |
| ft <sup>3</sup>            | cubic feet             | 0.03                       | cubic meters        | m <sup>3</sup>  |
| yd <sup>3</sup>            | cubic yards            | 0.76                       | cubic meters        | m <sup>3</sup>  |
| <b>TEMPERATURE (exact)</b> |                        |                            |                     |                 |
| °F                         | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C              |

\*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10:286.

## Approximate Conversions from Metric Measures

| Symbol                     | When You Know                     | Multiply by       | To Find                | Symbol          |
|----------------------------|-----------------------------------|-------------------|------------------------|-----------------|
| <b>LENGTH</b>              |                                   |                   |                        |                 |
| mm                         | millimeters                       | 0.04              | inches                 | in              |
| cm                         | centimeters                       | 0.4               | inches                 | in              |
| m                          | meters                            | 3.3               | feet                   | ft              |
| m                          | meters                            | 1.1               | yards                  | yd              |
| km                         | kilometers                        | 0.6               | miles                  | mi              |
| <b>AREA</b>                |                                   |                   |                        |                 |
| cm <sup>2</sup>            | square centimeters                | 0.16              | square inches          | in <sup>2</sup> |
| m <sup>2</sup>             | square meters                     | 1.2               | square yards           | yd <sup>2</sup> |
| km <sup>2</sup>            | square kilometers                 | 0.4               | square miles           | mi <sup>2</sup> |
| ha                         | hectares (10,000 m <sup>2</sup> ) | 2.6               | acres                  |                 |
| <b>MASS (weight)</b>       |                                   |                   |                        |                 |
| g                          | grams                             | 0.035             | ounces                 | oz              |
| kg                         | kilograms                         | 2.2               | pounds                 | lb              |
| t                          | tonnes (1000 kg)                  | 1.1               | short tons             |                 |
| <b>VOLUME</b>              |                                   |                   |                        |                 |
| ml                         | milliliters                       | 0.03              | fluid ounces           | fl oz           |
| l                          | liters                            | 2.1               | pints                  | pt              |
| l                          | liters                            | 1.06              | quarts                 | qt              |
| l                          | liters                            | 0.26              | gallons                | gal             |
| m <sup>3</sup>             | cubic meters                      | 35                | cubic feet             | ft <sup>3</sup> |
| m <sup>3</sup>             | cubic meters                      | 1.3               | cubic yards            | yd <sup>3</sup> |
| <b>TEMPERATURE (exact)</b> |                                   |                   |                        |                 |
| °C                         | Celsius temperature               | 9/5 (then add 32) | Fahrenheit temperature | °F              |







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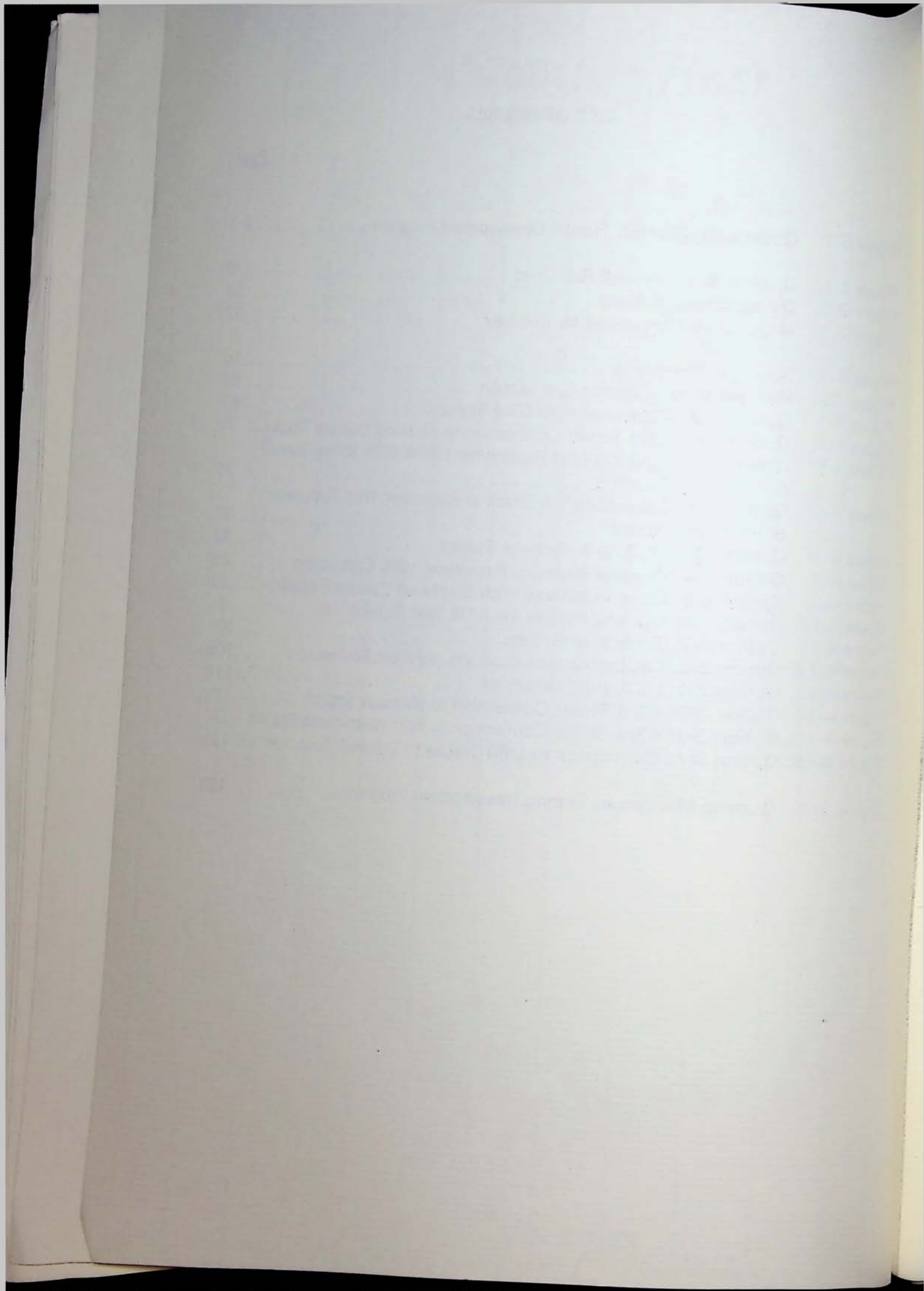
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## EXECUTIVE SUMMARY

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Problems of peak hour subway overcrowding continue to persist for Queens-Manhattan passengers. During the morning rush hour, more than 110,000 passengers use the 53rd Street, 60th Street and Steinway tunnels. Ridership exceeds the capacity of each tunnel, resulting in serious passenger discomfort especially on the E and F trains using the 53rd Street tunnel.

Plans for alleviating this congestion have been proposed for several decades. The 63rd Street tunnel, opened to 21st Avenue during 1989, represents the first step taken to improve congestion. The tunnel will be connected to the Queens Boulevard express and local tracks within the next decade to relieve the overcrowding on the Queens Boulevard trains.

Many concerns have been raised by public agencies and citizens regarding the adequacy of this extension. This study was initiated in response to those concerns. It takes a fresh look at a long-studied corridor. Its goals are to explore and assess concepts that address the problems of overcrowded subway lines, long journey times, and inadequate transit service to outer Queens, and how to better use the 63rd Street tunnel.

The work was done creatively and cooperatively with the public sector. The key steps included: (1) reviewing past proposals and impact assessment reports; (2) meeting with New York City Transit Authority (NYCTA) operations planning staff; (3) investigating the study corridor; (4) analyzing ridership trends, patterns, and markets; (5) screening and assessing both short and long term improvement concepts; (6) identifying preferred options; and (7) indicating implementation requirements.

### A. OPTIONS ANALYZED

The study assumes that the 63rd Street-Queens Boulevard connection (the "Northern Boulevard Connection") will be built as currently planned. Although the planned local-express connection fall far short of the earlier Queens Bypass proposal in relieving overcrowding, it does improve conditions. To defer this project, to search for an "ideal" solution is counterproductive. The resulting delay (as in 1979) would set the project completion date back another decade, during which period costs will escalate, and cost-effectiveness will diminish.

Both short and long range options were analyzed, based upon a Year 2000 ridership of 130,000 A.M. inbound passengers through the four Queens-Manhattan subway tunnels. By about 2015, the number of riders could approach 145,000.

Table S-1 summarizes the long-range options analyzed. Each of these options was assessed in terms of its physical feasibility, operating feasibility, ridership potential, costs, and institutional and environmental acceptability. Table S-2 summarizes the results of the analysis.

Table S-1

Summary of Long Range Options Analyzed

| 1. 63rd - Queens Blvd Connection                                                 | 2. Bypass Options                                                       | 3. LIRR Options                                                                 |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1-1 63rd St tunnel Express/Local connection only                                 | 2-1 Single track bypass                                                 | 3-1 LIRR - Long Island City transfers                                           |
| 1-2 3:1 Reverse Signaling                                                        | 2-2 Double track bypass                                                 | 3-2 63rd St - connection to Montauk branch                                      |
| 1-3 GG connection - 63rd                                                         | 2-3 Double track bypass without 71st station                            | 3-3 Conversion of Pt Washington branch                                          |
| 1-4 60th St - IRT joint running                                                  | 2-4 Connection to Rockaway line and JFK                                 | 3-4 Conversion of main line to subway operation in Queens, with Jamaica flyover |
| 1-5 60th St - IRT joint running with IRT realignment                             | 2-5 Queens Bypass with South East Queens extension                      | 3-5 LIRR connection to GCT/midtown                                              |
| 1-6 Reversible 5th track Roosevelt Ave - 74th St with Rockaway branch connection | 2-6 Connection to LIE East Central - Queens Line                        |                                                                                 |
| 1-7 Revised service pattern at Roosevelt Ave with Rockaway connection            | 2-7 Truncated Bypass at Grand St/Roosevelt (possibly with Rockaway Br.) |                                                                                 |
|                                                                                  | 2-8 Northern Blvd - LGA extension                                       |                                                                                 |
|                                                                                  | 2-9 LaGuardia extension only                                            |                                                                                 |



Table S-2

## Summary Assessment of Queens-Manhattan Transit Options

| OPTION         | Capital Cost<br>(millions of<br>1990 dollars) | Queens<br>Terminal for<br>G Service | Trains<br>Using<br>63rd St<br>Tunnel | Pass. Using<br>63rd St<br>Tunnel | Relief to<br>53rd St<br>Tunnel | New Subway<br>Trips Across<br>East River | Coverage of New<br>Areas                        | Engineering<br>Implications                | Development<br>Impacts | Institutional<br>Consideration | Remarks                                          |
|----------------|-----------------------------------------------|-------------------------------------|--------------------------------------|----------------------------------|--------------------------------|------------------------------------------|-------------------------------------------------|--------------------------------------------|------------------------|--------------------------------|--------------------------------------------------|
| 1-1 (a)        | 450                                           | Court Sq                            | 14                                   | 16,000                           | 9,000                          | -----                                    |                                                 |                                            |                        |                                |                                                  |
| 1-1 (b)        | 450                                           | Court Sq                            | 14                                   | 21,000                           | 10,000                         | -----                                    |                                                 |                                            |                        |                                |                                                  |
| 1-2            | 1200                                          | 71st Ave                            | 21                                   | 25,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                | Adverse<br>operation in<br>off-peak<br>direction |
| 1-3            | 700                                           | Manhattan                           | 21                                   | 21,000                           | 11,000                         | 2,000                                    | Direct service<br>North Brooklyn -<br>Manhattan | Very difficult<br>construction             | North<br>Brooklyn      |                                | Not practical                                    |
| 1-4            | 650                                           | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 2,000                                    |                                                 | Requires<br>special cars                   |                        |                                |                                                  |
| 1-5            | 725                                           | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 2,000                                    |                                                 |                                            | Sunnyside<br>Yard      |                                | Eliminates<br>Queensboro<br>Plaza transfer       |
| 1-6            | 950                                           | Court Sq                            | 21                                   | 23,000                           | 12,000                         | 3,000                                    | Direct service -<br>Rockaways                   | Disrupts<br>service during<br>construction |                        |                                |                                                  |
| 1-7            | 800                                           | Court Sq                            | 21                                   | 22,000                           | 13,000                         | 3,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-1            | 1300                                          | 71st Ave                            | 21                                   | 27,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                | Operationally<br>not practical                   |
| 2-2            | 1350 <sup>1</sup>                             | 71st Ave                            | 21                                   | 27,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-3            | 1300                                          | 71st Ave                            | 21                                   | 27,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-4            | 1350                                          | 71st Ave                            | 21                                   | 19,000                           | 7,000                          | 4,000                                    | Direct service-<br>JFK/Rockaways                |                                            |                        |                                |                                                  |
| 2-5            | 1550                                          | 71st Ave                            | 21                                   | 28,000                           | 11,000                         | 10,000                                   | Southeast Queens                                |                                            |                        |                                |                                                  |
| 2-6            | 1950                                          | 71st Ave                            | 21                                   | 27,000                           | 11,000                         | 7,000                                    | Eastern Queens                                  |                                            |                        |                                |                                                  |
| 2-7 (a)        | 6000 <sup>2</sup>                             | Court Sq                            | 14                                   | 19,000                           | 11,000                         | -----                                    |                                                 |                                            |                        |                                |                                                  |
| 2-7<br>(a,b,c) | 900                                           | Grand Ave                           | 14                                   | 19,000                           | 9,000                          | 3,000                                    | Direct service -<br>Rockaways                   |                                            |                        |                                |                                                  |
| 2-8 (a)        | 1650                                          | 71st Ave                            | 14                                   | 20,000                           | 7,000                          | 4,000                                    | Jackson Heights-<br>LaGuardia                   |                                            |                        |                                |                                                  |
| 2-8 (b)        | 1250                                          | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 5,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-9            | 1200                                          | Court Sq                            | 21                                   | 19,000                           | 9,000                          | 3,000                                    | LaGuardia                                       |                                            |                        |                                |                                                  |

Table S-2 (Continued)

| OPTION  | Capital Cost<br>(millions of<br>1990 dollars) | Queens<br>Terminal for<br>G Service | Trains<br>Using<br>63rd St<br>Tunnel | Pass. Using<br>63rd St<br>Tunnel | Relief to<br>53rd St<br>Tunnel | New Subway<br>Trips Across<br>East River | Coverage of<br>New Areas                     | Engineering<br>Implications | Development<br>Impacts | Institutional<br>Consideration                   | Remarks                                                   |
|---------|-----------------------------------------------|-------------------------------------|--------------------------------------|----------------------------------|--------------------------------|------------------------------------------|----------------------------------------------|-----------------------------|------------------------|--------------------------------------------------|-----------------------------------------------------------|
| 3-1     | 850                                           | Court Sq                            | 14                                   | (4)                              | (4)                            | (4)                                      |                                              |                             |                        | Yes                                              | Poor<br>passenger<br>attraction                           |
| 3-2 (a) | 1000                                          | 71st Ave                            | 21                                   | 19,000                           | 7,000                          | 5,000                                    | Richmond Hill,<br>Glendale,<br>Maspeth       |                             |                        | Community<br>objects to plan                     | Impacts LIRR<br>freight service                           |
| 3-2 (b) | 1000                                          | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 5,000                                    |                                              |                             |                        |                                                  |                                                           |
| 3-3 (a) | 970                                           | 71st Ave                            | 21                                   | 27,000                           | 7,000                          | 10,000                                   | Bayside/<br>Great Neck                       |                             |                        | Yes                                              | Allows 7 more<br>peak hour<br>trains into<br>Penn Station |
| 3-3 (b) | 970                                           | Court Sq                            | 28                                   | 33,000                           | 13,000                         | 10,000                                   |                                              |                             |                        | Yes                                              |                                                           |
| 3-4     | ----                                          | Court Sq                            | 14                                   | (4)                              | (4)                            | (4)                                      | Requires major<br>construction in<br>Jamaica |                             |                        | Possibly                                         | Not practical -<br>limits LIRR<br>capacity at<br>Jamaica  |
| 3-5     | 1650 <sup>3</sup>                             | Court Sq                            | 14                                   | (4)                              | (4)                            | (4)                                      | Very costly<br>construction                  |                             | Midtown                | May allow<br>benefit-<br>assessment<br>financing | Very long<br>range                                        |

## Notes:

<sup>1</sup> 900 without Northern Boulevard connection.<sup>2</sup> Without Northern Boulevard connection.<sup>3</sup> To 3rd Avenue terminal, to Grand Central Terminal.

(4) Not estimated.

## B. TRANSIT IMPROVEMENT PROGRAM

The recommended transit program that emerged from the comparative analysis is shown in Figure S-1 and Table S-3. This program is keyed to the transport needs of the Queens-Manhattan corridor over the next 25 years and to the resources that likely will be available. It reflects political and financial realities. But it also recognizes that better public transportation has been the key to New York City's growth and development. Therefore, it contains several bold very-long range proposals as well.

Early Action (1990-1995) - The following low-cost early action improvements should be implemented over the next few years to benefit travelers during the period that the Northern Boulevard Connection is built.

- 1-1 New Subway Cars. Sixty-foot cars should be used on the E and F Queens Boulevard express trains. This will help reduce dwell times at busy stations such as Roosevelt Avenue and Queens Plaza, and make it possible to consistently operate 30 trains per track per hour.
- 1-2 Faster J - Z Service. Service on the Broadway-Jamaica line should be speeded up by consolidating or closing lightly-used closely spread stations. The existing skip-stop operations should be retained. The Bowery, Alabama, and Cypress stations should be closed. It is also desirable to close the Cleveland, 85th-Forest, 102nd and 121st street stations. These closures will dramatically improve the attractiveness of the J-Z service to Lower Manhattan with minimum adverse affect on existing riders.
- 1-3 Improved Pedestrian Connections. Passenger connectivity should be improved in the Long Island City area. (a) A pedestrian connection should be built between the IND Queens Plaza station and the elevated IRT/BMT Queensboro Plaza station. This connection provides an alternative to the Roosevelt Avenue transfer in Jackson Heights. (b) A pedestrian connection should be built between the elevated IRT Courthouse Square station and the underground IND Court Square station. This connection should be implemented by Citicorp as it proceeds with its Phase II development.
- 1-4 Rosedale Transit Center. A transit center should be developed at the Rosedale station of the Long Island Rail Road. The center should be modestly designed; it should contain canopies, shelters, and enclosed waiting areas, and improved/expanded parking facilities. NYCTA and Nassau local and express routes should serve the station.

Stage II Improvements. The following improvements should be implemented by about 2005.



## Queens-Manhattan Transit Development Program

**Table S-3**

**Queens-Manhattan  
Transit Improvement Program**

| <b>Stage 1    1990 - 1995</b> |                                                                                                                                                                                |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-1                           | Operate 60-foot cars on Queens Boulevard line                                                                                                                                  |
| 1-2                           | Speed up J-Z service by station consolidation/closures                                                                                                                         |
| 1-3                           | Improve pedestrian connections in Long Island City                                                                                                                             |
| 1-4                           | Develop Rosedale Transit Center                                                                                                                                                |
| <b>Stage 2    1995 - 2005</b> |                                                                                                                                                                                |
| 2-1                           | Build Queens-Northern Boulevard express-local connection                                                                                                                       |
| 2-2                           | Connect 60th Street tunnel (at Queensboro Plaza) to Flushing line express track                                                                                                |
| 2-3                           | Provide 5th track at Roosevelt Avenue with connection to Rockaway line                                                                                                         |
| <b>Stage 3    Post 2005</b>   |                                                                                                                                                                                |
| 3-1                           | Connection 60th Street lower level to LIRR and provide 3rd Avenue station in Manhattan. (Ultimately extend across Manhattan and Hudson River as part of regional rail system.) |

- 2-1 Northern Boulevard Connection. The express-local connection should be built between the 63rd Street tunnel and Northern Boulevard. This connection will make it possible to operate 14 trains into Manhattan during the AM peak hour. This improvement, which would cost about \$450 million, should be completed around 1995.
- 2-2 60th Street-Flushing Line Connection. The 60th Street tunnel tracks at Queensboro Plaza should be extended to connect with the Flushing line express track west of 33rd Avenue. This will make it possible to route a portion of the R service via the Flushing express track, and operate an additional 7 peak hour trains (into Manhattan) via 63rd Street resulting in 21 trains using the 63rd Street tunnel. It would increase the capacity of the Flushing line, thereby avoiding the overloads that are anticipated by about 2000. This improvement, which would cost about \$200 million should be implemented by about 2,000.
- 2-3 Roosevelt Avenue Fifth Track. A fifth, reversible express track should be provided at Roosevelt Avenue to increase the capacity of the express service from about 28 to 35 trains per hour. A connection between the Queens Boulevard express tracks and a reactivated Rockaway line at about 63rd Drive would allow direct express service from the Rockaways to Midtown via the 63rd Street tunnel.

This project, in conjunction with the 60th Street-Flushing connection would result in 28 trains entering Manhattan via the 63rd Street tunnel in the morning peak hour, thereby achieving full use of the tunnel, and providing both 6th and 7th Avenue access to Manhattan. The project, which would cost about \$500 million, should be implemented, as needed, by about 2005 to 2010.

The three intermediate-range projects represent an incremental approach to providing better subway service to Eastern Queens. (1) They permit full use of the 63rd Street tunnel, with substantial relief to 53rd Street. (2) They provide additional capacity to Northern, Central, and Eastern Queens. (3) They penetrate new markets (i.e. Rego Park). (4) They provide faster service to Rockaways.

Projects 2-2 and 2-3 contain some innovative operating concepts. If these concepts prove unacceptable to the NYCTA and MTA, then an alternative subway improvement concept should be implemented. This alternate concept involves converting the Port Washington Branch of the LIRR to NYCTA operation. Fourteen subway trains would operate to and from Manhattan via the 63rd Street tunnel, 7 express from Great Neck, and 7 local from Little Neck. This project would cost about \$520 million.



Future Development - Post 2005. The lower level of the 63rd Street tunnel ultimately should be connected to the Long Island Rail Road in Queens and to Midtown Manhattan. A four stage development concept should be considered (1) initial development of a 4-track station on 3rd Avenue in Manhattan, (2) a two-track crosstown line in about 50th Street, (3) a possible future second two-track crosstown line at about 49th Street, (4) a two-track tunnel under the Hudson River to connect with New Jersey Transit electrified lines.

This is a costly concept, that should be undertaken as part of a bi-state regional express rail service improvement plan. Because of the benefits conferred to Midtown, part of the costs should be borne by the benefitted properties in Midtown Manhattan.

Corollary Improvements. The proposed improvements plan emphasizes NYCTA subway service improvements. There remains a need to improve rail access to the eastern Queens. This suggest better adapting the Long Island Rail Road to serve these markets through fare and schedule changes.

Implementing Improvements. The recommended improvement plan is only a starting point -- the task ahead is making it a reality as quickly as possible. This calls for achieving consensus on the early action proposals, and finding the means to implement them as soon as possible. It calls for moving ahead with the planned Northern Boulevard connection. And it calls for dedicating needed funding for subsequent subway improvements over the next twenty years.

Good public transportation -- subways and commuter rail in particular -- have made New York City, especially Manhattan, what it is today. Continued investment in public transport infrastructure, especially in the Queens-Manhattan Corridor is essential in the years ahead. This is the challenge that must be met.



## CHAPTER 1

### INTRODUCTION

#### A. BACKGROUND

The development of Queens followed the extension of rail lines into the borough. The early settlements in Jamaica and Flushing grew around the Long Island Rail Road. Developments in other parts of the Queens followed the Flushing and Astoria lines, and in turn the IND Queens Boulevard subway.

The IND 53rd Street tunnel, opened on August 19, 1933, and its continuation, the Queens Boulevard subway line, which reached Jamaica in 1937, spawned extensive apartment house building in the Queens Boulevard corridor. Ridership grew rapidly throughout the 1930's and 1940's, and continues, although at a slower rate to this date.

Service improvements and connections were progressively added to provide both better coverage and more capacity.<sup>1</sup> Between 1933 and 1940, there was only one service from Manhattan, the 'E' express via 8th Ave. In 1940 when the 6th Ave subway opened the 'F' express service was added filling the capacity of both the express trains and the tunnel. The line was extended from 169th to 179th Street in 1950 to provide an adequate terminal. A third service to Manhattan via the local tracks was provided, when a new connection was built between the under utilized 60th Street BMT tunnel, and the local tracks of the Queens Boulevard line in 1955. The Queens Boulevard service was extended to a new Jamaica Center Terminal along Archer Avenue in 1988.

The 63rd Street Tunnel (the result of three decades of debate and discussion) was opened to 21 Street in Queens in 1989 and represents a partial culmination of the New Routes program of 1968. Current NYCTA plans call for its connection to the Queens Boulevard line east of Queens Plaza.

The Subway Congestion Problem. Queens, the largest of New York City's five boroughs in land area, and second largest in population has grown about 2.3% in population between 1980 and 1985; however, the capacity of its public transport service has not been increased to meet the growing demands. Many Queens residents do not have ready access to the subway system, and those riding the Queens Boulevard E and F services in peak periods find these lines overloaded.

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<sup>1</sup>Robert A. Olmsted, History of the 63rd Street Tunnel Project and the Queens New Routes Subway Program, Aug. 11, 1988.



Despite the various actions taken over past decades, the problems of peak hour congestion continue to persist - improved public transportation between Manhattan and Queens remains a pervasive problem. Unlike Brooklyn and the Bronx, which provide extensive subway service, rapid transit is limited to the Steinway (42nd St.), 53rd, 60th and 63rd street tunnels. Eight tracks (of which only 6 are really effective) serve Queens as compared with 12 serving the Bronx and 18 serving Brooklyn. 1989 AM peak hour riders to Manhattan averaged 38,000 per track from the Queens as compared with 25,000 across the 60th Street cordon and 21,000 from Brooklyn. The lack of capacity, both across the East River and within the Queens, has resulted in serious overcrowding on the Queens Boulevard line and at times on the Flushing Line.

Previous Studies. The problem of Queens-Manhattan subway overcrowding has been long recognized, and many studies have addressed it over the past several decades.

1. Another tunnel to the Queens - either at 72nd or 76th Street was proposed in the 1940's, with a connection to the Queens Boulevard local tracks near Steinway street and possible future extensions along Northern Boulevard, the now abandoned LIRR Rockaway Branch and/or along the Horace Harding (now Long Island) Expressway.
2. A proposed 1951 construction program called for a 76th Street subway under the East River extending to Rego Park, Queens, via the Long Island Rail Road right of way with a possible connection to the proposed Rockaway Line.<sup>2</sup>
3. A 1958 report of the Mayor's Rapid Transit Planning Committee recommending adding a third track to a modernized outer portion of the BMT Jamaica elevation as a high-speed alternate route via the Williamsburgh Bridge-Chrystie Street connection to the 6th Ave subway.
4. A 1963 New York City Transit Authority Report proposed a 76th Street tunnel, connecting to the local tracks plus two branch lines, via Northern Boulevard, Kissena Boulevard, and LIE to Springfield Boulevard, and a branch of the Queens Boulevard line along the abandoned Rockaway Line.
5. A Citizens Budget Commission proposed "Triple Tracking" the Queens Boulevard line in 1963. The proposal called for a single-track reversible tunnel at 61st and a "three-one" operation along the Queens Boulevard during peak hours by means of reverse signaling.

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<sup>2</sup>Rapid Transit Construction Program, Board of Transportation, July 2, 1951.

6. A 1965 City Planning Commission report proposed a two-track tunnel at 63rd Street plus a "super-subway service" achieved by joint running via NYCTA and LIRR tracks.
7. A 1968 report prepared for the New York City Transit Authority by Coverdale and Colpitts proposal: (a) a connection between the Queens Boulevard line and the 63rd Street tunnel, (b) a new single reversible express track along the LIRR right-of-way; a connection in Manhattan to the BMT Broadway, IND Sixth Ave, and planned Second Ave lines, and a Southeast Queens branch.
8. The Metropolitan Transportation Authority's 1968 "New Routes" program proposal: a "bypass" express subway track along the Long Island Railroad, a two-level 63rd St tunnel (upper level for NYCTA and lower level for the LIRR), extension of LIRR service to East Midtown Manhattan and JFK Airport, and major reconstruction of the LIRR Harold interlocking complex. Specific proposals included: (a) completion of the already-authorized four-track 63rd Street crosstown subway in Manhattan with connections to 2nd Ave, 6th Ave and Broadway 7th Ave subways; (c) construction of a connection to the existing Queens Boulevard subway; (d) construction of a single high-speed reversible bypass track along the LIRR to a connection with the Queens Boulevard line at Forest Hills; (e) construction of a Northeastern Queens line along the LIE; (f) construction of a southeastern Queens line (including Archer Ave); and (g) replacement of the elevated line in the Jamaica Business District.

This "grand design" was written into state law in June, 1968. Because of NYCTA concerns, the bypass track was changed to a two-track route.

On July 8, 1970, the MTA Board approved the Grand Central terminal location for the Long Island Rail Road trains that would use the two lower-level tracks of the 63rd Street tunnel.

The 63rd Street tunnel with connections to the 6th and 7th avenues subways was completed, and service was initiated via Sixth Ave. to 21st in Queens during 1989. However, the other proposals were viewed as too costly by New York State DOT during the mid 1970's. This led to New York City DOT's Queens Transit Alternatives Study, 1981, and the MTA's Alternative Analysis - Draft Environmental Impact Statement, Queens Subway Options studies, May 1984; both of these studies searched for low cost options, such as a Northern Boulevard connection. Subsequently, the NYCTA suggested future reverse signalling of the express tracks and a new car storage yard in the Sunnyside yard area to allow a peak-period three-and-one operation.

1. The Queens Transit Alternatives study recommended five basic options for further analysis: (a) no additional construction; (b) Queens Bypass (Route 131-B); (c) Queens Boulevard local connection; (d) subway/LIRR Montauk transfer; and (e) Montauk-Archer subway connection.

2. Those five options were analyzed in the 1984 Alternatives Analysis study. The analysis, as well as comments from the public led to selecting the Queens Boulevard line local connection as the preferred option.

Current Status: The Queens Boulevard Subway Line Connection Supplemental Draft Environmental Impact Statement (SDEIS), completed in May, 1990, analyzed both the no-build and the local connection. However, it also analyzed a connection to both the local and express tracks. This latter option is preferred by the NYCTA, since it allows greater flexibility of operation.

Since these proposals were formulated, a changing development trend in Long Island City has placed a new dimension on the problem. Citicorp has built a large office building, and plans are being set forth for revitalizing the Queens waterfront, and the Sunnyside rail yard. These developments will increase travel to Long Island City and will need public transportation improvements as well.

## **B. STUDY OBJECTIVES AND CONTEXT**

Many concerns have been raised by public agencies, citizens, and the Urban Mass Transportation Administration (UMTA) regarding the proposed Northern Boulevard connection between the 63rd Street line and the Queens Boulevard line: Will the connection provide sufficient capacity to reduce overcrowding along Queens Boulevard? Is it responsive to the needs of the growing developments in Long Island City? Will it provide sufficient reserve capacity for future travel growth, or latent travel demands? What are the impacts on Queens-Brooklyn travel? Is it too costly? Are there more creative approaches to transportation development planning?

Objectives. This study was initiated in response to these concerns. It provides a fresh and imaginative look at a long-studied corridor. Its underlying objectives are to explore concepts that address the major public transport problems in the Queens overcrowding on existing subway lines (especially the E and F lines) inadequate coverage of and access to subway lines, long journey times to Manhattan from the outer Queens, and best use of the recently completed 63rd Street tunnel.

The goals are to:

1. Provide more transit capacity between Queens and Manhattan to relieve the overcrowding on the E and F line.
2. Provide better subway linkages between Queens and Manhattan, thereby reinforcing and strengthening the Manhattan Hub.
3. Serve new markets that are currently unserved by subway.
4. Provide improved transit access to the growing Long Island City commercial area.



5. Improve connectivity for intra-Queens trips, including reverse commutation.
6. Reduce passenger journey times and improve service reliability.
7. Reduce reliance on automobiles.

The study assumes that the Queens Boulevard connection at Northern Boulevard will be built. The planned connection includes a "bellmouth" for future extensions. Accordingly, the study identifies the additional subway and rail improvements that might be appropriate over the intermediate and longer range. In addition, it identifies short range actions that might be taken over the next several years to alleviate existing conditions.

### C. STUDY APPROACH

The work was done creatively and cooperatively with the public sector. The key steps included: (1) reviewing past proposals and impact assessment reports; (2) meeting with NYCTA operations planning staff; (3) reconnaissance investigations of the study corridor; (4) analysis of ridership trends and patterns, and markets; (5) screening and assessing concepts; (6) identifying preferred options; and (7) indicating implementation requirements.

### D. AN INITIAL PERSPECTIVE

Developing meaningful and cost-effective subway improvements in the Queens Boulevard corridor is no simple task. The prime market is clustered along Queens Boulevard, physical and track constraints make most improvements both difficult and costly. To date, no solution has emerged that both maximizes relief and is affordable.

The corridor problem has persisted for several decades. A prompt decision to build the two-track bypass in the mid 1970's would have probably resulted in a completed project at a cost not much higher than the proposed Northern Boulevard connection, illustrating the high cost of delay.



## CHAPTER 2

### TRAVEL PATTERNS AND PROBLEMS

The travel patterns and problems in the Queens-Manhattan corridor reflect the distributions of jobs and population, their likely changes in the next several decades, and the configuration of the existing subway and rail lines. Central to these problems are the initial design concept of the four-track Queens Boulevard line which provides only two tracks across the East River; the concentration of population along this line, and the large population catchment area beyond the outer subway terminals in Jamaica and Flushing.

#### A. SUBWAY SERVICE PATTERN

The present system of subway and rail lines serving Queens is shown in Figure 2-1. Table 2-1, in turn, summarizes the service patterns as of December 1989. The principal subway lines include the following:

1. The Q service to Brighton Beach operates in the 63rd Street tunnel and Sixth Ave from 21st in Long Island City.
2. The Queens Boulevard subway provides four basic services: (a) the E and F trains operate via the express tracks and the 53rd Street Tunnel traversing Manhattan on 8th and 6th avenues respectively; (b) the R trains operate on the local tracks, via the 60th Street tunnel and Broadway in Manhattan; (c) the G trains operate via the local tracks and the Queens Boulevard crosstown route.
3. The N trains operate from Ditmars Boulevard Astoria via the 60th Street tunnel and the Broadway line in Manhattan.
4. The number 7 locals and expresses operate from Main Street, Flushing via the Steinway tunnels to Times Square, Manhattan.
5. Three services operate in the Broadway Brooklyn elevated and Williamsburg Bridge to lower Manhattan; the J-Z skip-stop services from Jamaica Center, and the M service from Metropolitan Ave.

The Long Island Rail Road main line operates to and from Penn Station. Additional non-electrified service operates via the main line and Montauk branch to Hunters Point Ave in Long Island City.

The subway and rail services have been adjusted over the years to reflect changes in ridership, an extension to Jamaica Center, and opening of the 63rd Street tunnel; while simultaneously maximizing the use of each track.



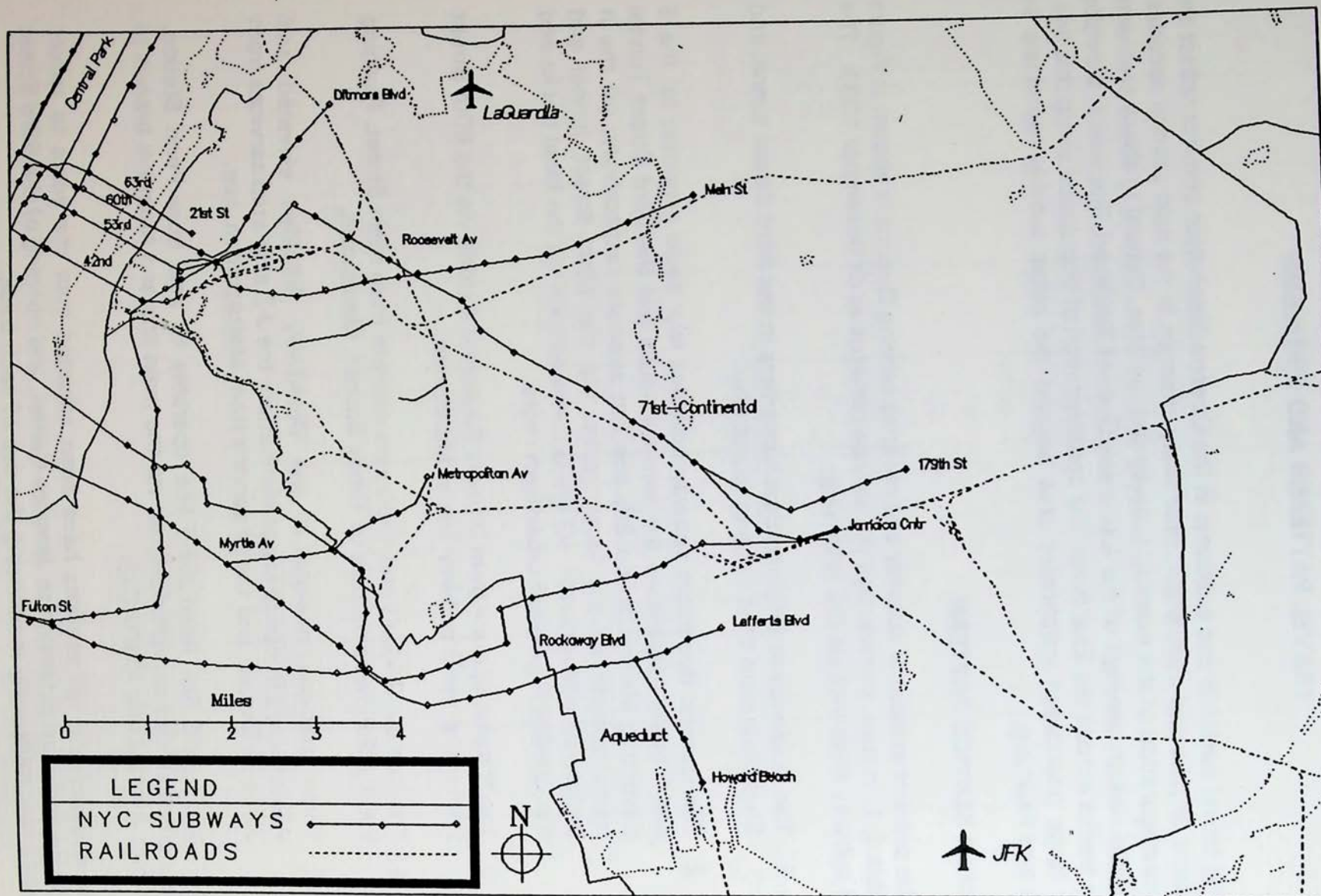


Figure 2-1

Queens Subway and Rail Lines

Table 2-1

## Existing Queens Peak Hour Subway Routes and Service Pattern (1991)

| SERVICE | # OF TRAINS | QUEENS                     |                  |                 | CROSSING         | MANHATTAN |                 | BROOKLYN            |                 | OTHER TERMINAL     |
|---------|-------------|----------------------------|------------------|-----------------|------------------|-----------|-----------------|---------------------|-----------------|--------------------|
|         |             | TERMINAL                   | ROUTE            | SERVICE PATTERN |                  | ROUTE     | SERVICE PATTERN | ROUTE               | SERVICE PATTERN |                    |
| Q       | 9           | 21st St - Long Island City | Long Island City | Local           | 63rd St          | 6th Ave   | Express         | Brighton            | Express         | Brighton Beach     |
| E       | 14          | Jamaica Center             | Queens Boulevard | Express         | 53rd St          | 8th Ave   | Local           | ---                 | ---             | World Trade Center |
| F       | 14          | 179th St                   | Queens Boulevard | Express         | 53rd St          | 6th Ave   | Local           | Jay-Smith-McDonald  | Local           | Coney Island       |
| G       | 6           | 71-Continental             | Queens Boulevard | Local           | ---              | ---       | ---             | Union Ave-Crosstown | Local           | Smith/9th St       |
| R       | 12          | 179th St                   | Queens Blvd      | Local           | 60th St          | Broadway  | Local           | 4th Ave             | Local           | 95th St            |
| N       | 12          | Ditmars Ave                | 31st St          | Local           | 60th St          | Broadway  | Express *       | 4th-Sea Beach       | Express         | Coney Island       |
| J       | 6           | Jamaica Cntr               | Jamaica Ave      | Skip Stop       | Williamsburgh Br | Nassau St | Local           | ---                 | ---             | Broad St           |
| Z       | 6           | Jamaica Cntr               | Jamaica Ave      | Skip Stop       | Williamsburgh Br | Nassau St | Local           | ---                 | ---             | Broad St           |
| M       | 6           | Metropolitan               | Myrtle Ave       | Local           | Williamsburgh Br | Nassau St | Local           | 4th-West End        | Express         | Bay Parkway        |
| 7       | 14          | Main St Flushing           | Roosevelt Ave    | Local           | 42nd St          | 42nd St   | Local           | ---                 | ---             | Times Square       |
| 7X      | 14          | Main St Flushing           | Roosevelt Ave    | Express         | 42nd St          | 42nd St   | Local           | ---                 | ---             | Times Square       |

\* With Manhattan Bridge in full service, otherwise local.

Source: NYCTA.



## B. EXISTING TRAVEL

Demands for subway service reflect the strong historical ties between Queens and Manhattan. Analysis of the 1980 journey to-work data and assembled by the New York Metropolitan Transportation Council, indicates that Queens residents made 823,000 work trips on a typical 1980 day of which 365,000 or 44% were to Manhattan (Table 2-2). When intra-Queens trips are excluded, some 70% of the Queens work trips are to jobs in Manhattan.

Cordon Crossings. The total number of people entering the Manhattan business district south of 60th street has closely mirrored the levels of Manhattan employment (see Table 2-3). Manhattan employment has declined from a peak of 2,000,000 in 1960 to a low of 1.7 in 1977; since then it has gradually increased to almost two million. Total 24-hour inbound cordon crossings peaked at 3.7 million entrants in 1948 and 3.35 million entrants in 1960, then declined to a low of 2.9 million in 1977, before increasing too 3.5 million in 1989.

The proportion of Hub-bound entrants coming from Queens increased steadily from 16% in 1948 to 22% in the mid 1970's. It has since stabilized at about 21%. The total Queens entrants grew from 640,000 in 1960 to 720,000 in 1989.

The subways carry the bulk of the travelers from Queens to Manhattan. The 1989 Hub-bound cordon count indicates that 420,000 of the 720,000 entrants came by subway. Another 110,000 came by the Long Island Rail Road. Thus, rail transit accounts for 72% of the daily number of people crossing the East River from Queens, Nassau, and Suffolk.

During the morning peak hour in 1989, some 170,000 people entered Manhattan from the Queens sector of these, 113,000 (66%) came by subway, 38,400 (23%) came by the LIRR and 5,100 (3%) came by bus. These figures underscore the importance of subway and commuter rail lines in delivering workers to the Manhattan business district.

Subway Ridership. The subway passengers from Queens entering Manhattan on a Fall 1989 business day by time of day and tunnel are summarized in Table 2-4. Approximately 43% of the total riders in both peak and off peak periods enter via the E and F trains through the 53rd Street tunnel. During the 8-9AM morning rush hour, 48,100 people used these trains; this was the largest number of subway riders per track, entering Manhattan.

Subway Overcrowding. The overcrowded conditions on the key Queens subway lines during the peak hours has been long recognized. The extent of this overcrowding has been analyzed as follows:

1. The numbers of trains, cars, passengers and passengers per train crossing the East River based and NYCTA passenger load checks (1987-1989) are summarized in Table 2-5 for peak 15, 30 and 60-minute time periods.



Table 2-2

1980 Journey to Work from Queens

| QUEENS TO             | NUMBER OF WORKERS | PERCENTAGE OF TOTAL RIDERS | PERCENTAGE OF INTER-AREA TRIPS |
|-----------------------|-------------------|----------------------------|--------------------------------|
| Bronx                 | 15,152            | 1.8                        | 2.9                            |
| Brooklyn              | 68,976            | 8.4                        | 13.3                           |
| Manhattan             | 365,102           | 44.4                       | 70.5                           |
| Queens                | 304,293           | 37.0                       | ---                            |
| Staten Island         | 1,204             | 0.1                        | 0.1                            |
| NYC Total             | 754,727           | 91.7                       | 86.8                           |
| Other                 | 68,100            | 8.3                        | 13.2                           |
| New York Region Total | 822,827           | 100.0                      | 100.0                          |

Source: New York Metropolitan Transportation Council.

Table 2-3

Trends in People Entering Manhattan Hub South of 60th Street  
For a 24-Hour Period On a Fall Business Day (In Thousands)

| YEAR | MANHATTAN<br>EMPLOYMENT | QUEENS<br>SECTOR | TOTAL | PERCENT<br>QUEENS |
|------|-------------------------|------------------|-------|-------------------|
| 1924 | NA                      | 237              | 2,343 | 10.1              |
| 1932 | NA                      | 355              | 2,697 | 13.2              |
| 1940 | NA                      | 538              | 3,271 | 16.4              |
| 1948 | NA                      | 602              | 3,691 | 16.3              |
| 1956 | NA                      | 613              | 3,313 | 18.5              |
| 1960 | 2007                    | 641              | 3,349 | 19.1              |
| 1963 | 1970                    | 615              | 3,290 | 18.7              |
| 1971 | 1913                    | 659              | 3,179 | 20.8              |
| 1972 | ---                     | ---              | ---   | ---               |
| 1973 | 1821                    | 645              | 3,024 | 21.3              |
| 1974 | 1780                    | 646              | 2,977 | 21.7              |
| 1975 | 1730                    | 661              | 3,008 | 22.0              |
| 1976 | 1689                    | 618              | 2,852 | 21.7              |
| 1977 | 1673                    | 613              | 2,862 | 21.4              |
| 1978 | 1722                    | 617              | 2,870 | 21.4              |
| 1979 | 1758                    | 637              | 2,931 | 21.7              |
| 1980 | 1777                    | 655              | 3,013 | 21.7              |
| 1981 | 1835                    | 654              | 3,074 | 21.2              |
| 1982 | 1852                    | 654              | 3,233 | 20.2              |
| 1983 | 1876                    | 686              | 3,268 | 21.0              |
| 1984 | 1915                    | 688              | 3,274 | 21.0              |
| 1985 | 1942                    | 683              | 3,362 | 20.3              |
| 1986 | 1944                    | 695              | 3,392 | 20.5              |
| 1987 | 2009                    | 713              | 3,415 | 20.9              |
| 1988 | 1987                    | 700              | 3,475 | 20.1              |
| 1989 | 1989                    | 720              | 3,482 | 20.7              |

Source: Hub-bound Travel 1989, New York Metropolitan Transportation Council, 1990.

Table 2-4

Subway Passengers Entering Hub from Queens Sector  
On a Fall Business Day in 1989

| TRAVEL                   | 8 - 9 AM | 7 -10 AM | 24 HOURS |
|--------------------------|----------|----------|----------|
| BMT - 60th Street tunnel | 29,258   | 66,647   | 118,222  |
| IND - 53rd Street tunnel | 48,112   | 104,089  | 179,863  |
| IRT - Steinway tunnel    | 35,420   | 71,203   | 119,702  |
| Subtotal                 | 112,790  | 241,339  | 417,787  |
| % via 53rd Street        | 42.6     | 43.1     | 43.0     |

Source: Hub Bound Travel 1989, New York Metropolitan Transportation Council (NYMTC), Oct. 1990.



Table 2-5

## NYCTA AM Peak Train and Passenger Volumes from Queens to Manhattan

| Line | Year | PEAK 15 MIN. |      |       |             | PEAK 30 MIN. |      |       |             | PEAK 60 MIN. |      |       |             |
|------|------|--------------|------|-------|-------------|--------------|------|-------|-------------|--------------|------|-------|-------------|
|      |      | Trains       | Cars | Pass. | Pass./Train | Trains       | Cars | Pass. | Pass./Train | Trains       | Cars | Pass. | Pass./Train |
| R    | 1989 | 4            | 36   | 4086  | 1022        | 7            | 60   | 7532  | 1076        | 12           | 104  | 12044 | 1004        |
|      | 1988 | 3            | 28   | 5616  | 1872        | 5            | 44   | 9207  | 1841        | 9            | 82   | 16635 | 1848        |
|      | 1987 | 3            | 26   | 4308  | 1436        | 6            | 54   | 7952  | 1325        | 9            | 84   | 11269 | 1252        |
| N    | 1989 | 3            | 26   | 4854  | 1618        | 6            | 50   | 8913  | 1486        | 12           | 104  | 18612 | 1551        |
|      | 1988 | 3            | 28   | 3254  | 1085        | 5            | 46   | 5635  | 1127        | 8            | 76   | 10473 | 1309        |
|      | 1987 | 4            | 38   | 5753  | 1438        | 6            | 60   | 10357 | 1726        | 12           | 118  | 19548 | 1629        |
| E-F  | 1989 | 8            | 64   | 13896 | 1737        | 15           | 120  | 27033 | 1802        | 27           | 216  | 48112 | 1781        |
|      | 1988 | 7            | 56   | 12687 | 1812        | 13           | 104  | 24554 | 1889        | 23           | 184  | 40904 | 1778        |
|      | 1987 | 8            | 64   | 14234 | 1779        | 15           | 120  | 27783 | 1852        | 29           | 232  | 49511 | 1707        |
| 7    | 1989 | 7            | 77   | 10128 | 1447        | 14           | 154  | 19161 | 1369        | 27           | 297  | 35420 | 1312        |
|      | 1988 | 7            | 77   | 10901 | 1557        | 11           | 121  | 18119 | 1647        | 24           | 264  | 31531 | 1314        |
|      | 1987 | 7            | 77   | 11921 | 1703        | 13           | 143  | 19353 | 1489        | 21           | 231  | 33089 | 1576        |

Source: NYCTA Ride Checks at Cordon Locations.

2. The schedule design capacities were estimated based upon criteria used in the July 1990 Environmental Impact Statement:

|                |         |                       |
|----------------|---------|-----------------------|
| • 75' cars     | 175/car | 2.33 per ft of length |
| • 60' cars     | 140/car | 2.33 per ft of length |
| • 51' IRT cars | 110/car | 2.16 per ft of length |

These capacities were multiplied by the appropriate train lengths to obtain the capacities per train.

|               |            |
|---------------|------------|
| • 8-75' cars  | 1400/train |
| • 10-60' cars | 1400/train |
| • 11-50' cars | 1210/train |

3. The capacities per train were compared with the passengers per train, and the volume-to-capacity ratios were computed. The results are shown in Table 2-6.

The analyses indicate that virtually all services operate at or beyond capacity during the morning peak 15, 30 and 60-minute periods. The E and F lines were the most overloaded, with a 3-year, 60-minute V/C ratio of 1.25 as compared with 1.16 for the number 7 service, and 1.07 for the N service and 0.98 for the R service.

The 53rd street tunnel has consistently carried over 1700 passengers per train for the past 30 years as shown in Table 2-7. During most years, during the morning peak hour, the trains per hour ranged from 23 to 29 except for 1976 and 1960, when 30 and 32 trains per track per hour were recorded. The higher number of trains in 1960 may reflect the use of ten 60-foot cars with 40 doors versus eight 75-foot cars with 32 doors.

Theoretically, trains should be able to operate 2 minutes apart through each tunnel. While this headway is sustained for a few 15-minute periods, each of the three tunnels was generally limited to about 27 to 28 trains per hour. In several years and/or time periods, fewer trains (longer headways) were found, suggesting blockage elsewhere along the line.

### C. FUTURE TRAVEL

Future peak hour travel on Queens subway (and rail) lines serving Manhattan will reflect three sources of ridership growth. These are (1) increased commuter trips resulting from Queens-Long Island population growth and Manhattan employment growth; (2) riders representing the "suppressed demand" due to inadequate capacity; and (3) new riders resulting from planned or contemplated development in Long Island City.

Population and Employment Growth. Household population forecast prepared for the Metropolitan Transportation Authority are summarized in Table 2-8. Population in Nassau, Queens and Suffolk Counties is expected to increase about 2% between 1990 and 2000, and about 2.6% between 1990 and 2015.

**Table 2-6**

**AM Peak Hour Volume Capacity Comparisons**

| Line | Year | Peak 15 min. | Peak 30 min. | Peak Hour | 3 Year Average |
|------|------|--------------|--------------|-----------|----------------|
| R    | 1989 | 0.73         | 0.77         | 0.72      | 0.98           |
|      | 1988 | 1.34         | 1.32         | 1.32      |                |
|      | 1987 | 1.03         | 0.95         | 0.89      |                |
| N    | 1989 | 1.16         | 1.06         | 1.10      | 1.07           |
|      | 1988 | 0.78         | 0.81         | 0.94      |                |
|      | 1987 | 1.03         | 1.23         | 1.16      |                |
| E-F  | 1989 | 1.24         | 1.29         | 1.27      | 1.25           |
|      | 1988 | 1.29         | 1.34         | 1.27      |                |
|      | 1987 | 1.27         | 1.32         | 1.22      |                |
| 7    | 1989 | 1.21         | 1.14         | 1.09      | 1.16           |
|      | 1988 | 1.30         | 1.49         | 1.10      |                |
|      | 1987 | 1.42         | 1.24         | 1.31      |                |

Source: Computed based on Table 2-5.



Table 2-7

## Trends in Westbound Travel Through 53rd Street Tunnel (8-9 AM)

| Year | Trains  | Cars      | Cars/Train | People          | People/Train |
|------|---------|-----------|------------|-----------------|--------------|
| 1960 | 32      | 320 °     | 10.0       | 61,400          | 1919         |
| 1971 | 24 °    | 240       | 10.0 °     | 48,350          | 2014         |
| 1973 | 24      | 230       | 9.6        | 56,150          | 2340         |
| 1974 | 26      | 236       | 9.0        | 58,320          | 2243         |
| 1975 | 25      | 225 °     | 9.0 °      | 51,960          | 2348         |
| 1976 | 30      | 282       | 9.4        | 62,220          | 2074         |
| 1977 | 29      | 270 °     | 9.3        | 54,800          | 1890         |
| 1978 | 29      | 246       | 8.5        | 48,070          | 1658         |
| 1979 | 27      | 216       | 8.0        | 58,020          | 2149         |
| 1980 | 26      | 214       | 8.2        | 55,120          | 2120         |
| 1981 | 28      | 224       | 8.0        | 53,240          | 1901         |
| 1982 | 26      | 208       | 8.0        | 54,530          | 2097         |
| 1983 | 29      | 232       | 8.0        | 60,120          | 2073         |
| 1984 | 29      | 232       | 8.0        | 60,640          | 2091         |
| 1985 | 29      | 232       | 8.0        | 51,580          | 1779         |
| 1986 | 25      | 200       | 8.0        | 43,898          | 1756         |
| 1987 | 25      | 200       | 8.0        | 47,395          | 1896         |
| 1988 | 20 (23) | 160 (184) | 8.0        | 37,352 (40,904) | 1868 (1778)  |
| 1989 | 20      | 216       | 8.0        | 48,112          | 1781         |

Note: ° - estimated. Figures in parenthesis denote NYCTA counts.

Source: 1971-1989 NYMTC. 1960 - Institute of Transportation Engineers.

**Table 2-8**  
**Long Island Household Population Projections**  
**(In Thousands)**

| Year                        | Nassau | Suffolk | Subtotal | Queens              | Total  | Index<br>(1990 = 1.00) |
|-----------------------------|--------|---------|----------|---------------------|--------|------------------------|
| 1980                        | 1304.5 | 1253.9  | 2558.4   | 1870.9 <sup>1</sup> | 4429.3 | 0.96                   |
| 1985                        | 1314.1 | 1282.2  | 2596.3   | 1912.2              | 4508.5 | 0.98                   |
| 1990                        | 1323.3 | 1362.5  | 2685.8   | 1927.5              | 4613.3 | 1.00                   |
| 1995                        | 1326.8 | 1405.9  | 2732.7   | 1937.5              | 4670.2 | 1.01                   |
| 2000                        | 1316.2 | 1448.4  | 2764.6   | 1943.5              | 4708.1 | 1.02                   |
| 2005                        | 1298.9 | 1482.6  | 2781.5   | 1945.5              | 4727.0 | 1.02                   |
| 2010                        | 1275.8 | 1508.9  | 2784.7   | 1947.5              | 4732.2 | 1.03                   |
| 2015                        | 1249.4 | 1531.6  | 2781.0   | 1953.3              | 4734.3 | 1.03                   |
| Net Increase<br>2000/1990   | -7.1   | 85.9    | 78.8     | 16.0                | 94.8   |                        |
| 2015/1990                   | -73.9  | 169.1   | 95.2     | 25.8                | 121.0  |                        |
| Percent Change<br>2000/1990 | -0.5   | 6.3     | 2.9      | 0.8                 | 2.1    |                        |
| 2015/1990                   | -5.6   | 12.4    | 3.5      | 1.3                 | 2.6    |                        |

Note: <sup>1</sup> Data show household population. 1980 Queens total population was 1891.3 (000).

Source: Projections prepared for Metropolitan Transportation Authority.

Forecasts of Long Island work trips with destinations in Manhattan are shown in Table 2-9. These forecasts anticipate a 4% increase in work trips from 1980 to 2000 and an 8% gain from 1989 to 2010. The anticipated increase numbers of work trips are as follows:

|                | 1989-2000 | 1989-2010 |
|----------------|-----------|-----------|
| QUEENS         | 14,358    | 30,868    |
| NASSAU-SUFFOLK | 6,328     | 10,438    |
| TOTAL          | 20,686    | 41,306    |

It is reasonable to expect that Queens trips will mainly come by subway, and that the Long Island trips will use the Long Island Rail Road. Assuming that half of the trips come in the peak hours the additional 8-9AM riders to Manhattan would be as follows:

|        | 1989-2000 | 1989-2010 |
|--------|-----------|-----------|
| SUBWAY | 7,179     | 15,434    |
| LIRR   | 3,164     | 5,219     |

**Suppressed Demand.** There is general consensus that the overcrowding on Queens subway lines during the 8-9AM peak period inhibits usage, and thereby consequently suppressed demand, some of the riders travel before or after the hour to avoid the crush loads. Table 2-10 gives estimates of this time-displaced demand, based upon the 1989 subway crossings and the peaking characteristics of riders crossing the 60th Street and Brooklyn cordons which have fewer capacity restraints. These comparisons suggest that there are about 6000 such riders at 1989 levels.

**Long Island City Development.** Various commercial developments have been proposed in the Long Island City over the past few years, following the initiative established by the Citicorp office building at Court Square. The various proposals set forth include the International Design Center expansion (1.3 million square feet) The 70-acre Hunter Point waterfront development (up to 10 million square feet) and a possible Sunnyside Yards Development (5.0 million square feet). Figure 2-2 shows how the developments, which could aggregate 20 million square feet, relate to the existing subway lines.

Collectively, these developments are estimated to empty 54,000 people, have 12,000 residents, and attract some 10,000 shoppers and visitors. This represents the fourth largest concentration of activity within the city exceeded only by the Manhattan CBD, downtown Brooklyn and JFK. If they all became a reality they would generate about 22,000 "inbound" and 7400 "outbound" trips in the AM rush hour; there would be about 10,000 "inbound" and 18,000 "outbound" trips in the evening rush hour.



**Table 2-9**

**Journey-to-Work Projections for Long Island to Manhattan**

| Year              | Nassau  | Suffolk | Subtotal | Queens  | Total   | Index<br>(1989 = 1.00) |
|-------------------|---------|---------|----------|---------|---------|------------------------|
| 1980              | 102,459 | 34,759  | 137,218  | 400,326 | 537,544 | 0.99                   |
| 1989              | 105,679 | 32,416  | 138,095  | 407,169 | 545,264 | 1.00                   |
| 1996              | 106,981 | 35,720  | 142,701  | 413,859 | 556,560 | 1.02                   |
| 2000 <sup>1</sup> | 108,587 | 35,836  | 144,423  | 421,527 | 565,950 | 1.04                   |
| 2005              | 110,594 | 35,980  | 146,574  | 431,113 | 577,687 | 1.06                   |
| 2010              | 112,549 | 35,984  | 148,533  | 438,039 | 586,570 | 1.08                   |
| Net Increase      |         |         |          |         |         |                        |
| 2000/1989         | 2908    | 3420    | 6,328    | 14,358  | 20,686  |                        |
| 2010/1989         | 6870    | 3568    | 10,438   | 30,868  | 41,306  |                        |
| Percent Change    |         |         |          |         |         |                        |
| 2000/1989         | 2.8     | 10.6    | 4.6      | 3.5     | 3.1     |                        |
| 2010/1989         | 6.5     | 11.0    | 7.6      | 7.6     | 7.6     |                        |

Note: <sup>1</sup> Interpolated.

Source: MTA Spreadsheet of Regional Plan Association Projections.

**Table 2-10**

**Estimated Suppressed 8-9 AM Peak Hour Queens to Manhattan Subway Trips**

**A. 1989 AM Peak Hour Subway Riders to Manhattan as Percent of**

|             | Peak 2 Hours | Peak 3 Hours |
|-------------|--------------|--------------|
| Queens      | 58.3         | 46.7         |
| 60th Street | 60.7         | 47.3         |
| Brooklyn    | 62.0         | 49.4         |

**B. Queens Subway Riders in Period**

|         |         |
|---------|---------|
| 193,446 | 241,339 |
|---------|---------|

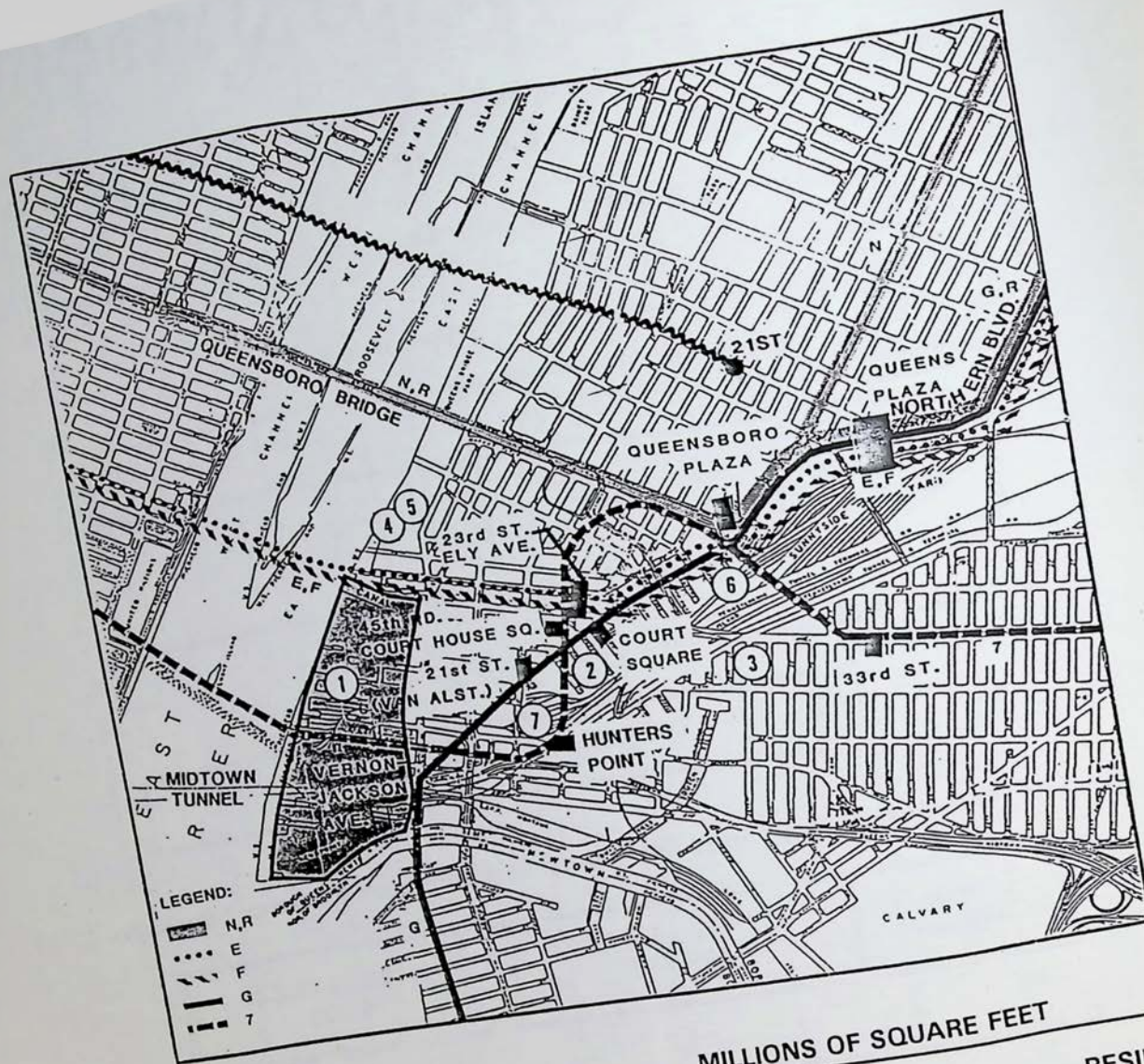
**C. Estimated Peak-Hour Riders Based Upon Peaking Factors for Other 2 Boroughs**

|         |                   |                   |
|---------|-------------------|-------------------|
| Range   | 117,422 - 119,937 | 114,153 - 119,221 |
| Average | 193,446           | 116,808           |

**D. Increase Over Queens Peak Hour Riders (112,790)**

|         |             |             |
|---------|-------------|-------------|
| Range   | 4637 - 7147 | 1363 - 6431 |
| Average | 5889        | 4018        |





Source: Urbitran Associates, Inc.

### MAJOR DEVELOPMENTS

1. HUNTERS POINT WATERFRONT
2. COURT SQUARE
3. INTERNATIONAL DESIGN CENTER
4. RIVERFRONT EAST
5. PDC DEVELOPMENT
6. QP MARKET PLACE
7. SUNNYSIDE YARDS DEVELOPMENT

TOTAL

| MILLIONS OF SQUARE FEET |            |             |
|-------------------------|------------|-------------|
| OFFICE                  | COMMERCIAL | RESIDENTIAL |
| 4.0                     | 1.0        | 5.0         |
| 1.8                     |            |             |
| 1.3                     |            |             |
| 0.7                     |            |             |
| NA                      |            |             |
| 2.0                     |            |             |
| 5.0                     |            |             |
| 14.8                    | 1.0        | 6.0         |

967 UNITS  
(Appx. 10,000,000 sq.ft.)

Figure 2-2  
Development Access



It is estimated that about 50% of the AM peak hour trips would use the subway lines, and up to 15% would use the LIRR. About half of the subway trips would come from Queens. This results in the following estimates of additional AM peak hour westbound trips.

|                      | SUBWAY | LIRR  |
|----------------------|--------|-------|
| WEST OF QUEENS PLAZA | 5,500  | 3,000 |
| ACROSS EAST RIVER    | 7,600  | ---   |

Composite Ridership Growth. The composite increases in AM peak have subway and LIRR ridership into Long Island City and across the East River into Manhattan are summarized in Table 2-11.

- In 2000, there would be up to 18,200 additional AM peak hour subway riders and 6200 additional LIRR riders east/north of Queens Plaza. About 14,700 additional subway riders and 3200 additional LIRR riders would enter Manhattan.
- By 2015, there would be up to 26,400 additional subway riders and 8200 additional LIRR riders east/north of Queens Plaza. There would be up to 22,900 additional riders entering Manhattan via a subway and 5200 via the Long Island Railroad.

Comparative Forecasts. AM peak hour ridership forecasts for 2000 as derived by the MTA and as estimated herein are compared in Table 2-12. The MTA ridership estimates on-a-line basis were obtained from the May, 1990 Draft Environmental Impact Analysis.<sup>1</sup> These estimates provided a basis for allocating the year 2000 riders among the various subway lines:

1. The 2000 AM ridership across the East River was estimated at 132,500 by the MTA. The ridership obtained by adding the increases in Table 2-11 to the Oct. 1989 cordon values results in 128,100, when both growth in Manhattan employment and suppressed trips are considered. When the ridership generated by Long Island City Development is added the total becomes 129,600.
2. The 2000 riders east of the Queens/Queensborough Plaza stations was estimated at 125,700 based upon the MTA data. The corresponding estimate herein is 125,000, but increases to 130,000 if Long Island City Development traffic is considered.

---

<sup>1</sup>Alternatives Analysis/Supplemental Draft Environmental Impact Statement for the Queens Subway Options, prepared by the Metropolitan Transportation Authority and New York City Transit Authority, May, 1990.

Table 2-11

Summary of Anticipated Increases in AM Peak Hour Westbound Trips

A. Subway

|                             | East of Queens Plaza |             | Across East River |             |
|-----------------------------|----------------------|-------------|-------------------|-------------|
|                             | 2000                 | 2010 / 2015 | 2000              | 2010 / 2015 |
| Manhattan Employment Growth | 7200                 | 15,400      | 7200              | 15,400      |
| Suppressed Demand           | 6000                 | 6000        | 6000              | 6000        |
| Long Island City Growth     | 5000                 | 5000        | 1500              | 1500        |
| TOTAL                       | 18,200               | 26,400      | 14,700            | 22,900      |

B. Long Island Railroad

|                             |      |      |      |      |
|-----------------------------|------|------|------|------|
| Manhattan Employment Growth | 3200 | 5200 | 3200 | 5200 |
| Suppressed Demand           | ---  | ---  | ---  | ---  |
| Long Island City Growth     | 3000 | 3000 | ---  | ---  |
| TOTAL                       | 6200 | 8200 | 3200 | 5200 |



**Table 2-12**

**Comparative Forecasts of Year 2000 AM Peak Hour Subway Ridership  
(Westbound)**

**A. East of Queens Plaza**

|                              | 1989   |            | 2000                          |                                           |                                                               |
|------------------------------|--------|------------|-------------------------------|-------------------------------------------|---------------------------------------------------------------|
|                              | Trains | Passengers | No Build - EIS<br>(May, 1990) | Manhattan<br>Growth &<br>Suppressed Trips | Manhattan<br>Growth,<br>Suppressed Trips,<br>Long Island City |
| Astoria<br>N                 | 12     | 16,000     | 17,800                        | 17,800                                    | 17,800                                                        |
| Queens<br>Boulevard<br>E / F | 27     | 47,700     | 52,400                        | 52,000                                    | 54,400                                                        |
| G                            | 6      | 2,900      | 3,200                         | 3,200                                     | 3,400                                                         |
| R                            | 12     | 15,900     | 24,100                        | 21,000                                    | 22,000                                                        |
| Flushing<br>7                | 27     | 30,000     | 31,200                        | 32,000                                    | 32,400                                                        |
| TOTAL                        | 84     | 111,800    | 125,700                       | 125,000                                   | 130,000                                                       |

**B. Across East River**

|                |    |         |         |         |         |
|----------------|----|---------|---------|---------|---------|
| 63rd St<br>Q   | 12 | 2,100   | 2,100   | 2,100   | 2,100   |
| 60th St<br>N   | 12 | 17,000  | 18,800  | 18,800  | 18,200  |
| R              | 12 | 12,300  | 20,000  | 18,000  | 18,200  |
| 53rd St<br>E/F | 27 | 48,100  | 52,800  | 52,400  | 53,000  |
| 42nd St<br>7   | 27 | 35,400  | 38,800  | 37,600  | 38,100  |
| TOTAL          | 90 | 114,900 | 132,500 | 128,100 | 129,600 |

Source: Estimated based upon 1989 NYMTC cordon count and May, 1990, Draft EIS Forecast.



At present, all lines running through the tunnel exceed their schedule design capacities. By 2000, the level of overcrowding will increase in all lines, unless additional connections are completed to allow better use of the 63rd Street tunnel.

#### **D. POTENTIAL MARKETS**

An important consideration in evaluating Queens subway options is the potential new or under-served markets. In the Queens Boulevard and Roosevelt Ave corridors, the issue is largely one of capacity rather than coverage. However, several sections of central Northern and eastern Queens lie beyond walking distance of subway stations. (See Figure 2-3.)

1. Northeastern Queens, which includes such areas as East Flushing, Aburndale, Bayside, Douglaston, and Fresh Meadow contains more than 400,000 people, most of whom live beyond the areas served by the Flushing or Queens Boulevard subway lines.
2. Southeastern Queens, which includes such areas as Jamaica, South Jamaica, Queens Village, Springfield Gardens and Laurelton contains almost 400,000 people; most of those people live beyond walking distances of the Queens Boulevard or Jamaica subway lines.
3. Central Queens areas along the Montauk Branch are generally too far from either the Queens Boulevard or Jamaica Ave. subway lines. These areas, which include sections of Maspeth, Ridgewood, Glendale and Middle Village contain almost 50,000 residents.
4. The section of north central Queens located between Northern Boulevard and LaGuardia Airport contains about 50,000 people that live beyond an easy walk to a subway station.

The lack of direct subway service results in two-mode two-fare trips (use of buses to subways); use of express bus lines, or as is the case in eastern Queens, a high incidence of auto driver trips. Consequently, the three terminal stations at Main Street Flushing, Jamaica Center, and 179th Street-Hillside are the three busiest in the city, drawing most of their patrons from eastern Queens.



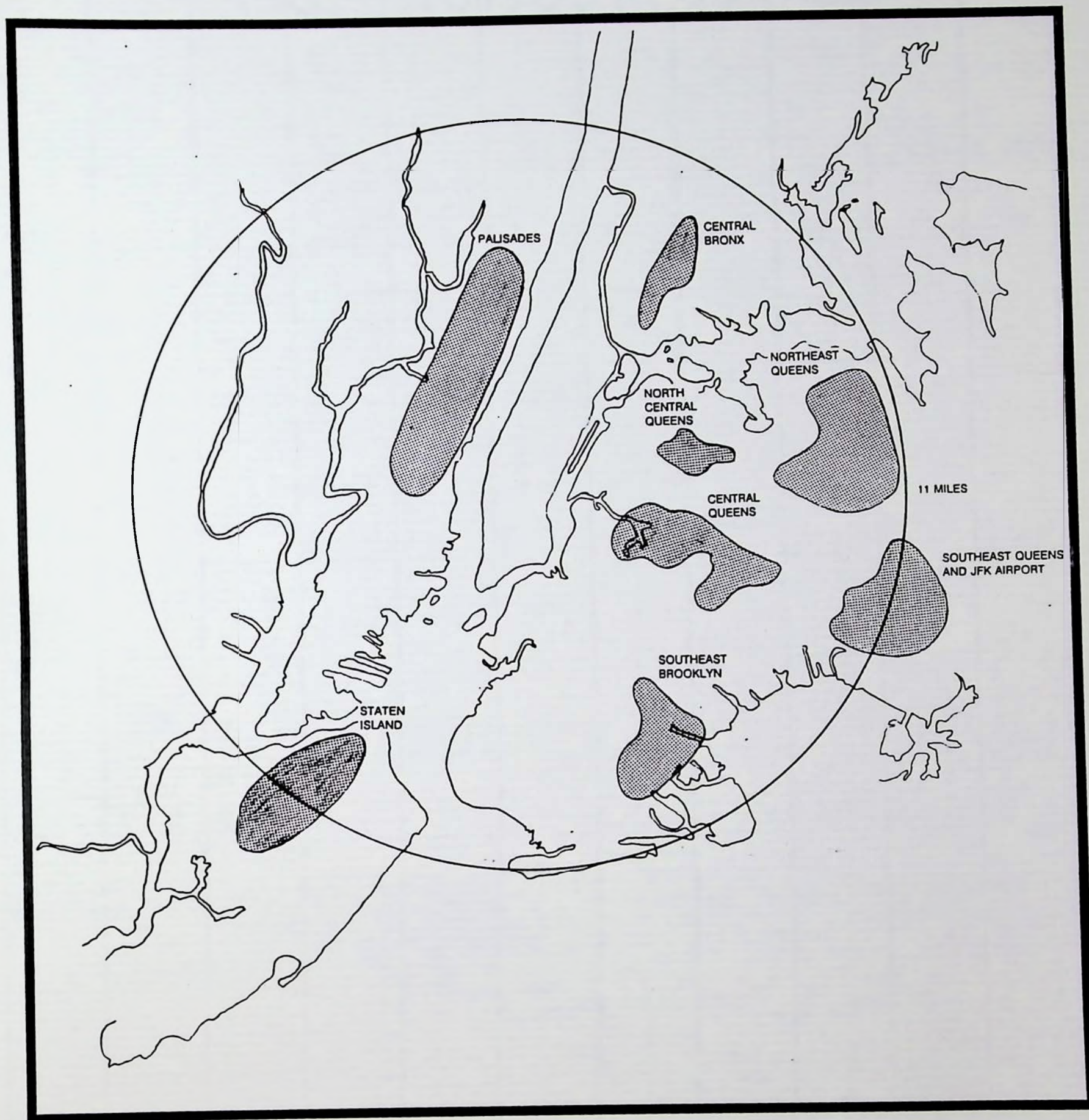
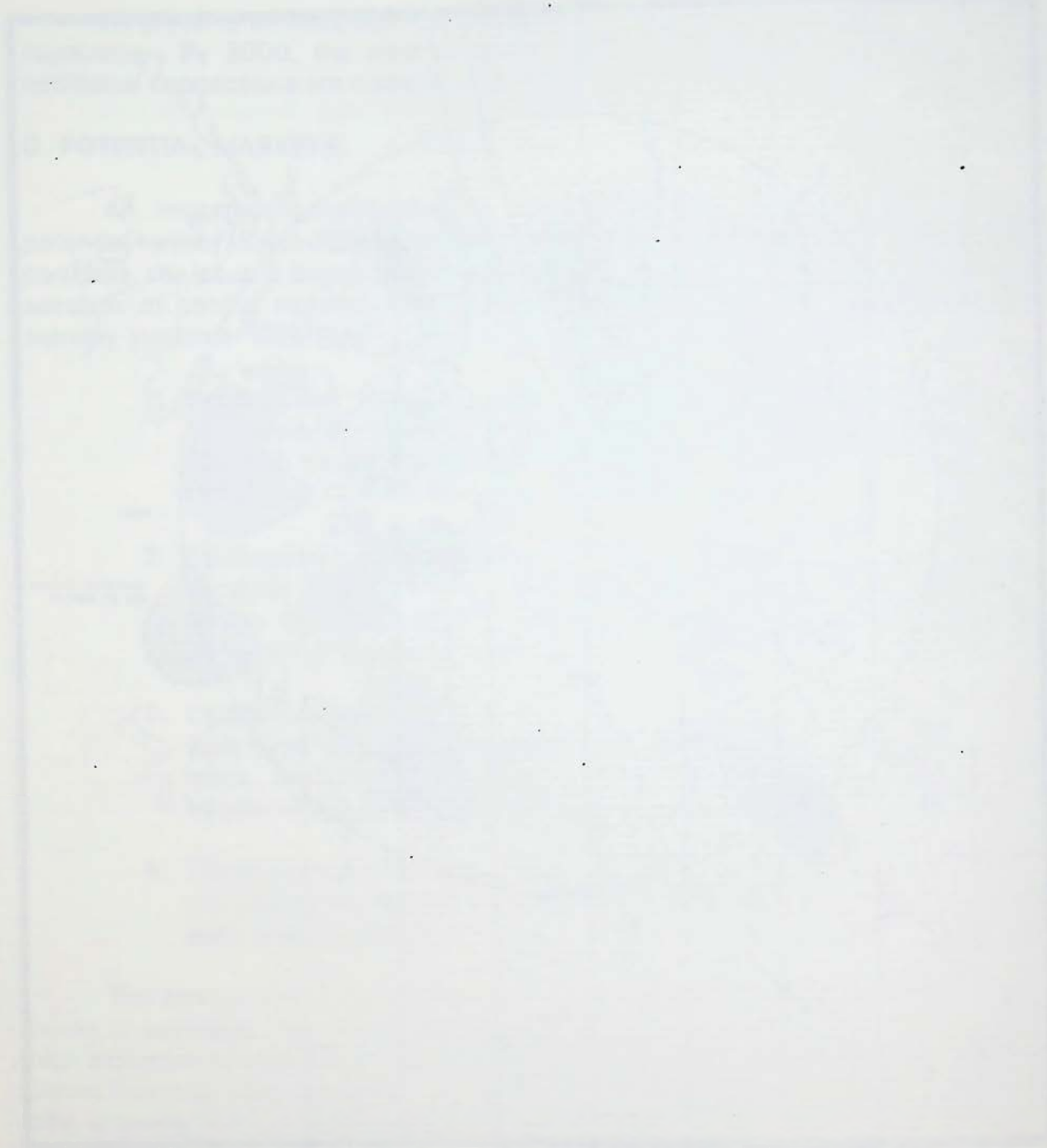


Figure 2-3

Major Areas Unserved by Subway





## CHAPTER 3

### SHORT RANGE ACTIONS

Construction of subway connections or other physical improvements in the Queens Boulevard corridor will take nearly a decade to complete. In the interim, overcrowding on the subway lines entering Manhattan will increase. Therefore, short-range actions must be taken to provide near-term relief. Some of these actions would also complement major physical improvements.

This chapter identifies some of the short range improvement possibilities for subway service in Queens. Short range improvements are defined as those that can be implemented and yield benefits before the 63rd Street/QBL connection is complete and operational. Their basic goals are to make the existing Queens rail transit system work better by reducing overcrowding, redistributing passengers and providing better transportation to the passenger.

The short range improvement options are designed to accomplish four major objectives:

1. To allow more trains on the E/F Queens Boulevard Expresses during the peak hour.
2. To provide alternative alternate subway access from Queens to Manhattan via other subway routes.
3. To improve connectivity between the various subway stations in Long Island City.
4. To improve bus-LIRR interchange in southeastern Queens.

The following short range improvements were analyzed:

- increased capacity on the E and F lines by using 60-foot cars and/or by changing service patterns.
- alternative service plans for the Broadway-Jamaica (JZ) line.
- additional free transfers between Queens subway lines.
- SE Queens, Rosedale Transit Center.

#### A. INCREASING THE CAPACITY OF QUEENS BOULEVARD SUBWAY SERVICE

The capacity of the Queens Boulevard Line express tracks has actually declined over the last three decades. In the 1960's, up to 34 E and F trains were scheduled in the peak hour, and often this schedule was achieved. The 1960 Hub-bound cordon count, for example recorded 32 westbound trains in the morning peak-hour.

The current schedule calls for 30 trains, and for several years less than 20 trains were scheduled. Actual throughput over a 60-minute period is usually 27 to 29 trains, although up to 8 trains have been recorded westbound during the morning peak 15-minutes.

One reason for the reduction in track capacity is the increased station dwell times resulting from a loss in door capacity. This translates into longer train dwell times. It should be noted that other factors also contributed to the reduction in throughput capacity, notably restrictions on "key-buying", a practice that allowed a train to pass red signals at slow speed so that the train could close in and enter a station sooner while the leading train was departing. Train capacity analyses contained in a Technical Annex to the Queens Transit Report, found that the actual dwell times at Roosevelt Ave and Queens Boulevard are not able to achieve two-minute headways (Table 3-1). They found that a minimum headway of about 2 minutes 15 seconds (27 trains per track per hour) with 85% certainty.

Accordingly, two capacity enhancement options were analyzed (1) using 60-foot cars rather than 75-foot cars for E/F express service, (2) having Manhattan-bound E/F trains skip Roosevelt Ave and/or Queens Plaza during the AM peak period.

Operating 60-foot Cars. Before the introduction of the 75-foot long R-46 class car, E and F trains were made up of ten 60-foot long cars, each car having four doors per side. With R-46 equipment, a train consists of eight 75-foot long cars, each car also having four doors per side. This change represents a loss of eight doors over the 600-foot length of the train (40 doors vs. 32 doors), and it has contributed to an increase in station dwell time and a loss in throughput capacity. In fact, the configuration of the four-door long R-1/9 car was selected in the late 1920's as the optimum design following a careful study of many car sizes, door arrangements, and interior configurations. The solution is to re-equip the heavily used E and F trains with 60-foot cars. The use of 60-foot cars for the E-F services will increase the number of doors per train by 25%. This should reduce dwell times at the busiest stations by at, say 10%, and make it possible to consistently operate 30 trains per track per hour.

The Draft E.I.S. report for the Queens Transit Alternatives Study indicates that a 10-car train with 60-foot cars has a schedule-design capacity of 1450 passengers, as compared with a capacity of 1400 for an 8-car train with 75-foot cars. The combined effects of more trains and more capacity per train would result in up to an 11% gain in passenger capacity.

The NYCTA recognizes the importance of providing more doors per car, and at the end of 1990 re-introduced 60-foot cars into the E and F service. This is an important first step toward improving operating conditions.

Table 3-1

Comparison of Maximum and Observed Dwell Times By Station (1978)

| Route           | Track | Station      | Max Allowable<br>Station Dwell to Achieve<br>a Two-Minute Headway<br>(seconds) | Observed Dwell<br>Times <sup>a</sup><br>(seconds) |
|-----------------|-------|--------------|--------------------------------------------------------------------------------|---------------------------------------------------|
| E               | D-3   | Continental  | 58                                                                             | 52                                                |
|                 |       | Roosevelt    | 57                                                                             | 62 <sup>b</sup>                                   |
|                 |       | Queens Plaza | 73                                                                             | 75 <sup>b</sup>                                   |
| F               | D-3   | Continental  | 61                                                                             | 38                                                |
|                 |       | Roosevelt    | 57                                                                             | 62 <sup>b</sup>                                   |
|                 |       | Queens Plaza | 73                                                                             | 75 <sup>b</sup>                                   |
| N <sup>c</sup>  | D-1   | Roosevelt    | 67                                                                             | 63                                                |
|                 |       | Queens Plaza | 56                                                                             | 63 <sup>b</sup>                                   |
| GG              | D-1   | Roosevelt    | 67                                                                             | 63                                                |
|                 |       | Queens Plaza | 66                                                                             | 63                                                |
| N <sup>d</sup>  | G-1   | Lexington    | 67                                                                             | 69 <sup>b</sup>                                   |
| RR <sup>d</sup> | G-1   | Lexington    | 67                                                                             | 69 <sup>b</sup>                                   |

<sup>a</sup> Observed Mean plus one standard deviation for a "normal" fifteen-minutes period.

<sup>b</sup> Observed time exceeds maximum allowable time.

<sup>c</sup> Now R service.

<sup>d</sup> Now N service.

Source: Technical Report, Queens Transit Alternatives.



| CONDITION | SCHEDULE<br>DESIGN<br>CAPACITY<br>PER TRAIN | TRAINS PER<br>TRACK PER<br>HOUR | PEOPLE<br>PER<br>HOUR | INDEX |
|-----------|---------------------------------------------|---------------------------------|-----------------------|-------|
| PRESENT   | 1400                                        | 28                              | 39,200                | 1.00  |
| PROPOSAL  | 1450                                        | 30                              | 43,500                | 1.11  |

An alternative is to replace the existing R-46 fleet with new 75-foot cars that have 5 doors per car (such cars operate in Hong Kong's subway where maximum passenger volumes are reported as 70,000 persons per track per hour). The 67-foot four door car, being considered by the TA is only a partial step in this direction, since there would be 36 doors per train, as compared with 40 as suggested herein.

**Skipping Express Stations.** Roosevelt Avenue and Queens Plaza are the major "bottleneck points" along the Queens Boulevard Manhattan-bound express tracks. The bottlenecks result from the heavy passenger interchange and long dwell times at each station. The "bottleneck" at Roosevelt Avenue meters the westbound train flow, and is, therefore, often more perceptible.

The passenger service and subway operational effects of skipping these stations are as follows:

1. Skipping both stations would minimize the transferring between express and local services. It would reduce dwell times and enable the express track to accommodate more trains.

The maximum number of trains that would be accommodated would be limited by dwell times at the 53rd-5th Avenue and 53rd-Lexington Avenue stations in Manhattan. It is estimated that 32 peak hour trains per hour could be accommodated as compared with 27 to 29 trains at present.

2. Skipping only one station would increase passenger interchange and dwell times at the other. There would be no gain in passenger throughput.
3. The travel time benefits to E/F passengers west of Roosevelt Avenue would be affected by the travel time losses to passengers boarding between 67th Avenue and Roosevelt Ave, and by added walking distances in Manhattan.
  - Some 40,300 E/F riders would save about 60,500 minutes. However, 3000 passengers transferring at Roosevelt Avenue and 5200 passengers boarding at Roosevelt would lose about 36,900 minutes.

- About 12,000 passengers boarding between Roosevelt Avenue and Queens Plaza plus the 3000 passengers currently transferring at Roosevelt Avenue would have to walk an additional 1000 feet; this translates into about 62,500 minutes lost.
4. Passenger loadings on the N train would increase, resulting in loads per train approaching those on the E and F trains. This is apparent from an analysis of the May 1989 inbound riders to Manhattan shown in Table 3-2.
- The total riders entering Queens Plaza by train were as follows

| TRAIN | NUMBER | PERCENT |
|-------|--------|---------|
| E     | 27,194 | 41.0    |
| F     | 20,170 | 30.5    |
| R     | 15,894 | 24.0    |
| G     | 2,933  | 4.5     |
|       | 66,191 | 100.0   |

- The Roosevelt Avenue station contributes 5200 inbound riders, mainly to the E and F service trains. Thus, if E/F trains skipped Roosevelt Ave, the R (and G) services would have to carry these riders. The local tracks would carry about 40% of the total riders as compared with about 30% at present. However, most passengers would use "N" trains, increasing the level of crowding (even with more trains operated).
  - Skipping Queens Plaza would add another 1400 riders. However, about 3000 riders currently transfer to the N service at Queens Plaza; thus, the net increase in N riders across the East River would be about 6300 (i.e.,  $5200 + 1400 - 3000$ ).
5. Subway riders on Queens Boulevard west of Forest Hills have the choice of 6th, 7th, or 8th Avenues delivery in Manhattan. If E and F trains skip Roosevelt Ave. and Queens Plaza, these passengers would be restricted to 7th Ave. delivery, requiring either longer walking distances or additional transfers in Manhattan. More significantly, they would probably use N service inbound and E/F service outbound - an undesirable practice from both passenger and transit operating standpoints.
6. Skipping both stations would meet with strong community opposition.

These operating plans, therefore, should not be considered further at this time.

TABLE 3-2

## Station-to-Station Subway Volume By Route (8-9 AM; May 1989)

| Route | From             | To               | Volume * |
|-------|------------------|------------------|----------|
| E     | Jamaica Center   | Sutphin          | 3,583    |
|       | Sutphin          | Jamaica-Van Wyck | 4,255    |
|       | Jamaica-Van Wyck | Union            | 4,814    |
|       | Union            | 71st-Continental | 11,586   |
|       | 71st-Continental | Roosevelt        | 19,855   |
|       | Roosevelt        | Queens Plaza     | 27,194   |
|       | Queens Plaza     | 23rd             | 26,142   |
|       | 23rd             | Lexington        | 25,489   |
| F     | 179th            | Parsons          | 12,430   |
|       | Parsons          | Union            | 20,238   |
|       | Union            | 71st-Continental | 20,498   |
|       | 71st-Continental | Roosevelt        | 20,331   |
|       | Roosevelt        | Queens Plaza     | 20,170   |
|       | Queens Plaza     | 23rd             | 21,583   |
|       | 23rd             | Lexington        | 22,195   |
| R     | 179th            | 169th            | 387      |
|       | 169th            | Parsons          | 5,007    |
|       | Parsons          | Sutphin          | 2,509    |
|       | Sutphin          | Van Wyck         | 4,506    |
|       | Van Wyck         | Union            | 6,460    |
|       | Union            | 75th Avenue      | 4,754    |
|       | 75th Avenue      | 71st-Continental | 5,369    |
|       | 71st-Continental | 67th Avenue      | 4,113    |
|       | 67th Avenue      | 63rd Drive       | 5,054    |
|       | 63rd Drive       | Woodhaven        | 6,783    |
|       | Woodhaven        | Grand            | 10,014   |
|       | Grand            | Elmhurst         | 12,180   |
|       | Elmhurst         | Roosevelt        | 13,890   |
|       | Roosevelt        | 65th             | 9,857    |
|       | 65th             | Northern         | 10,327   |
|       | Northern         | 46th             | 10,971   |
|       | 46th             | Steinway         | 12,464   |
|       | Steinway         | 36th             | 13,481   |
|       | 36th             | Queens Plaza     | 12,874   |
|       | Queens Plaza     | Lexington        | 15,894   |
| G     | 71st-Continental | 67th Avenue      | 96       |
|       | 67th Avenue      | 63rd Drive       | 155      |
|       | 63rd Drive       | Woodhaven        | 236      |
|       | Woodhaven        | Grand            | 348      |
|       | Grand            | Elmhurst         | 459      |
|       | Elmhurst         | Roosevelt        | 598      |
|       | Roosevelt        | 65th             | 957      |
|       | 65th             | Northern         | 1,010    |
|       | Northern         | 46th             | 1,166    |
|       | 46th             | Steinway         | 1,342    |
|       | Steinway         | 36th             | 1,534    |
|       | 36th             | Queens Plaza     | 1,587    |
|       | Queens Plaza     | Court Square     | 2,933    |

\* Volume as estimated by MTA Planning, August 1989.



## B. IMPROVING BROADWAY - JAMAICA SERVICE

The Jamaica Elevated (J line) is 2.78 miles shorter than the E line between the Parsons/Archer station (Jamaica Center) and the Chambers Street station in lower Manhattan (12.66 miles vs. 15.44 miles). However, because of more closely spaced stations and several sharp curves, the average speed on the J line is less than on the E line (about 15 mph vs 21 mph off-peak, 17 mph (skip-stop) vs. 19 mph peak). The larger number of closely-spaced stations on the J line (27 stations between Parsons/Archer and Chambers Street vs. as little as 19 on the E) is a major psychological deterrent to using the J line.

Many of the stations along the J line are lightly used. The line's daily ridership is matched by the 1990 boardings at the five Hillside Avenue (F-line) stations between 179th Street and Van Wyck. J-line boarding passengers approximate 50,000-55,000 (slightly over 2,000 per station). About 12% of the riders board in Jamaica, and 32% between Chauncey and Marcy. The Transit Authority has recognized the potential of the shorter J line distance in attracting lower Manhattan passengers through service improvements. When the Archer Avenue subway opened in 1988, a peak hour skip-stop service was put into effect in the peak direction of travel. This service (J trains alternating with the Z trains) skips eleven stations and saves about 5 to 6 minutes. In addition, the environment of the J line has improved. The cars are clean and graffiti free, and many of the stations have been cleaned up.

Accordingly, Jamaica elevated service is probably the best it has ever been, and there has been an increase in riding on the J/Z trains between Jamaica and lower Manhattan. Unfortunately, the attractiveness of the transfer between J/Z and E trains at Sutphin Boulevard has also encouraged some passengers to "backtrack" to take E trains to Manhattan (presumably mid-Manhattan).

The AM peak-hour Manhattan-bound ridership across the Williamsburgh Bridge has increased from about 15,000 in the 1984-1988 period to over 18,000 in 1989 (Table 3-3). While other factors may have contributed to this ridership growth, the faster service (8 fewer stops) is probably a key factor.

The question, then, is are there other ways to operate the Jamaica El to attract more riders to it and thereby relieve the Queens Boulevard lines. One way is institute revised service patterns such as instituting a Z 'Super Express'. Another way is to consolidate or permanently close selected stations. Both of these opportunities are analyzed in this report.

Revised Service Patterns. Two changes in the existing service patterns (see Table 3-4) were explored (1) converting the Z into a super express and (2) introducing a K local service from Eastern Parkway or Rockaway Parkway and running J/Z trains non-stop from Eastern Parkway to Marcy Avenue during the rush hours.

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1. Z Super Express. The skip-stop J/Z service is, of course, one way to achieve express service. The problem is that J/Z trains do not skip enough stops. Another way is to convert the Z into a "super express" (Super Z), alternating with all-stop J trains. (The stopping pattern of the J trains would remain constant throughout the day). Super Z trains would make only nine stops between Parsons/Archer and Broad Street, instead of the 18 stops made by the skip-stop trains. About 5 additional minutes would be saved.

*The following example shows how it would work:*

In the morning rush hour, an all-stop J train would leave Parsons/Archer say at 8:00 AM and arrive on the local track at Eastern Parkway at 8:24½ AM. The following train, a Super Z train would leave Parsons/Archer at 8:06½ AM, stop only at Sutphin (LIRR), Woodhaven and Crescent, and arrive on the express track at Eastern Parkway at 8:25½ AM, one minute after the arrival of the J local. The J local would wait for the Super Z at Eastern Parkway to allow passengers to transfer. The Super Z would then operate over the express track, non-stop to Essex Street in Manhattan, stop at Canal, Chambers, Fulton and reach Broad Street at 8:43, about 4½ minutes faster than a skip-stop train. The all stop local would reach Broad Street at about 8:53 AM. The cycle would repeat every ten minutes throughout the rush hour. If ridership increased, the cycle could be reduced to eight minutes.

These estimates of running time are based on October 1989 running times. Published running times in the 1960s were faster in some cases; for example, only 12 minutes was needed between Eastern Parkway and Essex Street on an express train, vs an estimated 15 minutes today (on Super Z). Perhaps the 1960's schedules were optimistic, but any effort that would allow trains to run faster is desirable.

There are two major advantages of the Super Z concept. The number of station stops is dramatically reduced, and there is a further reduction in travel time, from Jamaica. On the other hand, there would be an increase in waiting time at the two Archer Avenue stations. Under the skip-stop system, skip-stop trains (J or Z) leave every five minutes for a 47½ minute run to Broad Street. Under the Super Z proposal, a Super Z leaves every ten minutes for a 43 minute run to Broad Street. Assuming an average wait of half the headway, there is still a time savings ( $43 + 5 = 48$  minutes vs.  $47½ + 2½ = 50$  minutes), but the psychological effect of cutting the number of station stops in half (18 to 9) is significant. The waiting time at skipped stations is unchanged. The scheme would, of course, be operated in reverse in the evening.

No physical changes have to be made to test the proposal. A test would show whether passengers value a faster trip with fewer stops (reduction in perceived travel time) more than a slower trip with less waiting time.

One possibility is to operate the Super Z concept on an experimental basis for a meaningful period (six months to a year), and that adequate surveys be made to measure the impact on riding and both the J and E lines. After the test, Super Z service could be made permanent, if successful, or if not successful, the skip-stop J/Z service would be restored.

The disadvantages of the Super Z concept include possible imbalances in train loads and additional transfers between local and express services.

2. Alternate Concept. The J/Z skip-stop trains could run non-stop between Eastern Parkway and Marcy Street, if a peak-period K local service were introduced between Eastern Parkway (or Rockaway Parkway) and Manhattan. The Myrtle Avenue M trains would run express from Myrtle-Broadway to Marcy Avenue in the peak direction whenever the K trains operate.

This service plan has the following desirable features:

1. The J-Z service to Broad Street make 3 fewer stops each, by running non-stop from Eastern Parkway to Marcy Street. The number of stations is reduced from 18 to 15, with a travel time saving of 2 minutes.
2. The K service would probably operate to midtown and 21st via 6th Avenue local tracks, reducing loads on the F service west of Delancey Street.
3. Peak hour express service would be reintroduced on the Myrtle Avenue (M line).
4. Peak-hour inbound loads on the four services would be approximately balanced.

Station consolidation. The consolidation and closure of closely spaced lightly-used stations would reduce travel times along the Broadway-Jamaica line, benefiting most riders, and making the line more attractive for Jamaica and southeast Queens subway riders going to Lower Manhattan. The station spacing on the elevated portion (some parts of which were originally built in the 1880's) averages about 0.4 miles, and minimum spacing is 0.27 miles. On a hypothetical replacement subway line, average station spacing would likely be between 0.5 and 0.6 miles.

Some of the stations on the Jamaica El are among the least used in the City. Although politically unpopular, a case could be made for closing or consolidating several stations. Candidate stations for closure (low volume stations close to each other) are shown in Table 3-5 for various daily and A.M. peak-hour boarding thresholds.



**TABLE 3-5**

**Analysis of Candidate Station for Closure (Broadway-Jamaica Line)**

| Estimate AM Peak<br>Hour Boarding<br>Passengers | Estimate Daily Boarding Passenger               |                                                 |                                |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------|
|                                                 | < 1000                                          | 1000 - 1500                                     | over 1500                      |
| < 250                                           | Cypress Hills<br>Alabama<br>Bowery <sup>1</sup> |                                                 |                                |
| 250 - 500                                       |                                                 | 121<br>111<br>104 - 102<br>85<br>75<br>Chauncey | Cleveland<br>Hewes<br>Flushing |

<sup>1</sup> based on PM boardings.

**TABLE 3-6**

**Potential Peak Hour Service Patterns with Stations Closed  
(Broadway - Jamaica Line)**

|                             | Minimum<br>Closure<br>Skip-Stop | Additional |                      | Closures                      |
|-----------------------------|---------------------------------|------------|----------------------|-------------------------------|
|                             |                                 | Skip-Stop  | Exp/Local<br>Jamaica | Exp Jamaica<br>Local Canarsie |
| Jamaica Center              | J,Z                             | J,Z        | J,Z                  | J                             |
| Sutphin                     | J,Z                             | J,Z        | J,Z                  | J                             |
| 121st                       | Z                               | Closed     | Closed               | Closed                        |
| 111th                       | J                               | J          | J                    | J                             |
| 104th-102nd                 | Z                               | Closed     | Closed               | Closed                        |
| Woodhaven                   | J,Z                             | J,Z        | J,Z                  | J                             |
| 85th-Forest                 | J                               | Closed     | Closed               | Closed                        |
| 75th-Elderts                | Z                               | Z          | J                    | J                             |
| Cypress Hills               | Closed                          | Closed     | Closed               | Closed                        |
| Crescent                    | J,Z                             | J,Z        | J,Z                  | J                             |
| Norwood                     | J                               | J          | J                    | J                             |
| Cleveland                   | Z                               | Closed     | Closed               | Closed                        |
| Van Sicklen                 | J                               | Z          | J                    | J                             |
| Alabama                     | Closed                          | Closed     | Closed               | Closed                        |
| Broadway-Eastern Pkwy       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Chauncey                    | Z                               | J          | J                    | K                             |
| Halsey                      | J                               | Z          | J                    | K                             |
| Bates                       | Z                               | J          | J                    | K                             |
| Kosciusko                   | J                               | Z          | J                    | K                             |
| Myrtle                      | J,Z                             | J,Z        | J                    | K                             |
| Flushing                    | --                              | --         | --                   | K                             |
| Lorimer                     | --                              | --         | --                   | K                             |
| Hewes                       | --                              | --         | --                   | K                             |
| Marcy                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Essex                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Bowery                      | Closed                          | Closed     | Closed               | Closed                        |
| Canal                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Chambers                    | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Fulton                      | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Broad                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Stations Closed             | 3                               | 7          | 7                    | 7                             |
| Stops Reduced (per service) | 1                               | 3          | -1 (J) / 8 (Z)       | 4 (J)                         |

K would begin at Eastern Pkwy. or Rockaway Pkwy. It would operate to Broad Street or via 6th Avenue to Midtown.

The Z express would make 8 fewer stops than the existing J/Z skip-stop trains, while the local would make one more. This service pattern makes the Broadway line a very attractive alternate to the E train for Lower Manhattan trips. However, it could result in imbalanced loadings on trains, especially for outbound PM peak hour trips. Moreover, unless riders are attracted from the E trains, the expresses would be under-utilized. Passengers boarding at local stations would experience minimal benefits, although transfers to or from expresses at Eastern Parkway would save passengers time.

- 2-3** With the additional station closures, a "J" express could operate from Jamaica Center, making all stops to Eastern Parkway and then running non-stop to Marcy Ave. A local "K" service would start either at Eastern Parkway or at Canarsie, making all stops to Manhattan. The Myrtle Avenue M service would operate express from Myrtle-Broadway to Marcy Ave. The J express would make four fewer stops than the present skip-stop service. This concept would simplify scheduling trains and achieve a good load balance.

The number of stops for the various station closure and their related subway operating concepts are as follows:

|     |                                                  |    |
|-----|--------------------------------------------------|----|
|     | Present skip stop                                | 18 |
| 1-1 | Minimum Closures-skip stop                       | 17 |
| 2-1 | Additional Closures-skip stop                    | 15 |
| 2-2 | Additional Closures-super express                | 10 |
| 2-2 | Additional Closures-all stop                     | 19 |
| 2-3 | Additional Closures-express from Eastern Parkway | 14 |

The rush hour service should extend over a two hour period, rather than 60 minutes as at present.

**Additional Improvement Concepts.** A plan should be prepared for physical improvements to the J line. Had there been a master plan in place when the Alabama to Crescent stations were rebuilt, consolidating stations (three instead of five) might have been possible. Other projects that should be addressed in a master plan include: reconstruction of the Crescent Street curves for higher speeds (current limit 10 mph); a grade-separation connection with the M line to improve that operation, eliminate a capacity constraint, and reduce delays; rehabilitation of the depressing 1913 vintage Canal Street and Chambers St. stations to encourage ridership; realignment of the tracks between Chambers and Canal to speed (northbound) trains.

In addition, there has been a proposal to establish a transfer between the J and G lines. One promising option is to relocate the platforms of the Lorimer Street station westward to Union Street to effect the transfer connection, and to allow consolidation with the Hewes Street station. Finally, a long range solution to the Williamsburgh Bridge problem, either a new East River tunnel, or a connection to the under-utilized 14th St. tunnel, must be addressed in a master plan for the J line. A master plan would allow improvements to be programmed in an ad hoc manner with projects unrelated to each other.



### C. PROVIDING ADDITIONAL FREE TRANSFERS BETWEEN QUEENS SUBWAY LINES

Free transfers between rapid transit lines make the system more useful. They make it possible to reach more destinations for a single fare, improve circulation within the CBD, and lessen dependence on the automobile for jobs in outer boroughs - in this case, Queens. Access to jobs, especially outlying jobs is made easier, and more alternative routes are available to bypass service disruptions or to substitute for nighttime reductions in service.

Background. Since 1948, scores of free transfers have been established throughout the subway system. Nevertheless, there are still about a dozen places in the City where additional free transfers could be logically established. Two of these sites are in Queens.

Before 1940, the three divisions of the subway system -IRT, BMT and IND - were separately operated rapid transit systems, and passengers had to pay an extra fare to change from one system to another.

Although unification took place in 1940 when the City bought out the private interests in the IRT and BMT lines, unification in the eyes of the passenger did not begin until 1948 when fourteen inter-divisional free transfer points were established at the same time that the long-sacrosanct five-cent fare was doubled to ten cents.

One of these free transfer points was established at Broadway and Roosevelt Avenue in Jackson Heights, which has since become one of the busiest such interchanges in the City. Initially a paper transfer was used. An escalator was built a few years later, a second escalator after several more years, and two additional escalators are currently under construction. The heavy volume of transfer traffic contributes to the congestion on the Queens Boulevard subway line and at the Roosevelt Avenue station.

For forty years the Roosevelt Avenue and Queensboro Plaza stations were the only transfer points in Queens. The opening of the Archer Avenue subway in 1988 established a linkage between the Queens Boulevard line (E trains) and the Jamaica Avenue elevated line (J/Z trains). This interchange permits some "around-the-horn" travel, allowing Queens Boulevard passengers to take advantage of the skip-stop J/Z service to Lower Manhattan, and giving Jamaica El passengers access to important Queens destinations such as courts in Kew Gardens, shopping in Rego Park, and faster E trains to mid-Manhattan. Unfortunately, the interchange probably has added to overcrowding on the E train. The Archer Avenue subway also provides a convenient interchange with the LIRR (not free) which is potentially important for reverse commuters and intra-Queens travelers.

Another free transfer was established in 1988 at 23rd/Ely-Court Square between E/F and G trains. This will be an essential transfer facility after the 63rd Street/QBL connection is built when G trains will have to be turned back at Court Square or Queens Plaza. The transfer passageway is located in the basement of the new Citicorp building, tallest in Queens, and was paid for by the developer.

Two additional transfer points should be established in Queens:

- Queensboro Plaza/Queens Plaza
- Court Square/Courthouse Square.

Both would service a useful purpose and both have been studied by others to some extent.

Queensboro Plaza/Queens Plaza. This transfer would connect the elevated Queensboro Plaza station (no. 7 and N trains) and the underground IND Queens Plaza station (E, F, G, and R trains). This connection was studied by the TA Engineering Department in 1978 in response to a request by MTA's Intermodal Coordinating Committee (now defunct), and found to be feasible.

The recommended scheme was to build an overhead passageway, extending in a straight line (for security reasons) from 28th Street to Northern Boulevard, attached to existing columns on the north side of the elevated structure. Just west of 28th Street, a cross passage would be placed under the southbound N train track to connect with a new stairway up to the east end of the lower level elevated platform. (Two track girders would have to be modified to gain adequate vertical headroom.) Just west of Northern Boulevard, in a parking lot known as John F. Kennedy Commuter Plaza, a bank of two escalators, a stairway, and perhaps an elevator, would descend some 35 to 40 feet to the level of the IND mezzanine.

This feature would be similar to the transfer connection at 161st Street in The Bronx. The passageway would be comparable in length to the well-used transfer passageway under 41st and 42nd streets in Manhattan.

This transfer would provide a number of benefits. First, travel within Queens would be improved. For example, presently Astoria line passengers have no direct access to the Queens Boulevard subway. An Astoria passenger traveling to Queensboro Hall now has to pay a double fare, take a longer trip with multiple transfers to avoid the extra fare, or give up and drive. Second, the transfer provides an alternative when service is disrupted and Astoria trains are rerouted to Queens Boulevard and vice versa. Such an event occurs occasionally and usually without warning. Using the proposed transfer, passengers can easily change back to their desired route. Additionally, there are times when there is no through 60th Street service (now R trains) to the Queens Boulevard line, especially during the late night owl hours. It also provides an alternative to the congested interchange at Jackson Heights, and would be especially useful to passengers boarding west of Jackson Heights.

Court Square/Courthouse Square. This transfer would connect the elevated Courthouse Square station of the Number 7 line, and the underground Court Square station of the G line. It would consist of an escalator and stair placed in an enclosure constructed in 45th Road at the south end of the two stations.

Preliminary plans (30%) level have been prepared by Citicorp, and the project would be implemented should Citicorp proceed with phase II of their development.

The transfer would provide several benefits. First, it would provide better access to the Grand Central area for residents of northern Brooklyn (Greenpoint). Second, in the short run (until the 63rd Street/QBL connection is operational) the transfer could provide some relief to overcrowded E and F trains. Presently, Manhattan-bound Queens Boulevard subway passengers boarding G trains at local stations on the QBL must transfer to other trains at express stations, adding to the load on E and F trains. With the transfer in place, some G passengers would elect to remain on the less crowded G train to Court Square and transfer to the Number 7 line to Manhattan. While this would add to the load on the number 7 train, there are two mitigating factors. First, the number 7 train is slightly less crowded after leaving Queensboro Plaza (more passengers change to N trains than board number 7 trains at Queensboro Plaza). Second, since the remaining trip is short (about eight minutes, Courthouse Square to Grand Central), a greater loading can be tolerated for a short time.

#### **D. SE QUEENS ROSEDALE TRANSIT CENTER**

Southeast Queens is one of several areas in the city unserved by subway lines. Accordingly, the area is heavily dependent on buses that feed subway stations in Jamaica. The 1968 MTA plan proposed an extension of Queens Boulevard service into SE Queens along a route following the Atlantic branch of the Long Island Railroad (LIRR). The first section of this line (Route 131-D) was built as the Archer Avenue subway that opened on October 27, 1988. The extension along the Atlantic branch is not currently programmed.

A short range alternative to extending the subway is to make better use of the existing LIRR tracks and stations in SE Queens. Four LIRR stations are located in the area, three on the Atlantic branch (Locust Manor, Laurelton and Rosedale), and one on the Montauk branch (St. Albans). By far the busiest of these is Rosedale. Three to four trains stop at Rosedale during peak hours at headways varying from 14 to 30 minutes. Midday base service is hourly. Several local bus lines (Q5, Q85, Q86), and one TA express bus (X63) pass near the station, and a large municipal parking lot is adjacent to the station.

The Montauk Transfer alternative proposed in the 1984 Queens Subway Options Study (QSOS) was based on greatly expanded service from Rosedale (and Queens Village on the LIRR Main line) employing dedicated LIRR trains operating to a transfer station with the 63rd Street subway in Long Island City (Thompson Avenue). A simpler transfer scheme that requires no change to LIRR facilities involves developing a Rosedale into a modest transit center. An off-street bus loading area would be constructed in the parking lot. Canopies, shelters and an enclosed waiting area would protect waiting passengers from the weather. The parking area would be expanded, repaved and striped, and would include all the area to North Conduit Ave.



There would be provision for taxis, other local transportation, and kiss-and ride. The whole area would be attractively landscaped, well-lighted, secure, and designed to be an asset to the community. There are many examples of well-designed transit centers in the country that can be used as a model.

Only minor changes are proposed for LIRR service. Schedule adjustments should be made to assure that the headway will not exceed 20 minutes in the peak, and 30 minutes midday. This will entail stopping some additional Long Beach and Far Rockaway trains, and perhaps adding cars to existing trains. Additional LIRR trains would be run only when (and if) the LIRR installs automatic fare collection (AFC), joint bus, subway and LIRR fares will be feasible under the MTA umbrella.

The LIRR has Proposed the development of regional transportation hubs within its service area in its proposed 1992-1996 capital program. At least one of these should be in Queens, and Rosedale, because of its location, available area, and traffic potential would be the prototype and become the recognized transportation hub for the Southeast Queens region. Access to the railroad will be improved. The Q5, Q85 and Q86 local buses can feed both the LIRR and the X63 express bus. LIRR travel time is about 11 minutes to Jamaica, and 30 to 35 minutes to either Brooklyn or Penn Station.

#### **E. SUGGESTED DIRECTIONS**

The analyses of short-range options suggests the following directions for an early action program.

1. The TA should continue to replace the 75-foot cars on the E and F lines with 60-foot cars to increase door capacity and allow at least 30 trains per hour consistently during peak hours.
2. The Broadway-Jamaica elevated service should be speeded up. Three lightly used stations (Bowery, Cypress Hills, and Alabama Avenue) should be closed. Simultaneously consolidation of other stations, and further revisions in service patterns.
3. The Queensboro Plaza/Queens Plaza transfer between subway lines should be included in the MTA capital program. Private funds should be sought from developers in the Long Island City area to contribute to the project.
4. The Court Square/Courthouse Square transfer connection should be implemented as soon as funding can be obtained. To the maximum extent possible, funds should be raised primarily from developers in the Long Island City/Hunters Point section of Queens, the original intent.
5. The MTA, in conjunction with the LIRR and NYCTA should develop the multi-modal Rosedale Transportation Center for southeast Queens.

## CHAPTER 4

### DESCRIPTION OF IMPROVEMENT CONCEPTS

#### A. CONTEXT

The short range actions will provide some immediate relief to the Queens Boulevard corridor. However, they do not address the issue of travel growth, and they will provide little benefit to residents of Eastern Queens. Additional subway improvements are essential to provide the needed capacity relief and rapid transit access.

Scope. This chapter identifies and assesses various longer range improvement options for the Queens - Manhattan corridor. It describes the pertinent features of each option, shows how the subway service will operate, presents ridership forecasts and sets forth general cost estimates.

Analysis Procedure. The general analysis procedure is shown in Figure 4-1. Each option was analyzed in terms of the following factors:

- Physical Feasibility - Can the line be built in the designated corridor?
- Operating Feasibility - Will it produce a practical service pattern that balances the use of tracks and tunnels, and does not produce undue switching or storage problems?
- Ridership Potential - How many riders are likely to use each service, and each tunnel? Is there a reasonable balance between the services provided, and the riders they carry? How much relief is provided to the 53rd Street tunnel, and how many people will use the 63rd Street tunnel? What new markets will the subway system serve?
- Costs - What are the relative order of magnitude capital costs, and how do they relate to the service benefits provided?
- Institutional and Environmental Acceptability - Does the option produce any environmental or institutional problems, and how can such problem be addressed?

The desirable attributes of a rail transit improvement option include the following.

1. It can be built with minimum adverse impacts and at reasonable cost.
2. It provides a reasonable operating plan - one that does not rely on unusual operating practices. There should be no more than two basic full services per track, places to turn trains around (or store them), and rational links to Manhattan trunk lines.

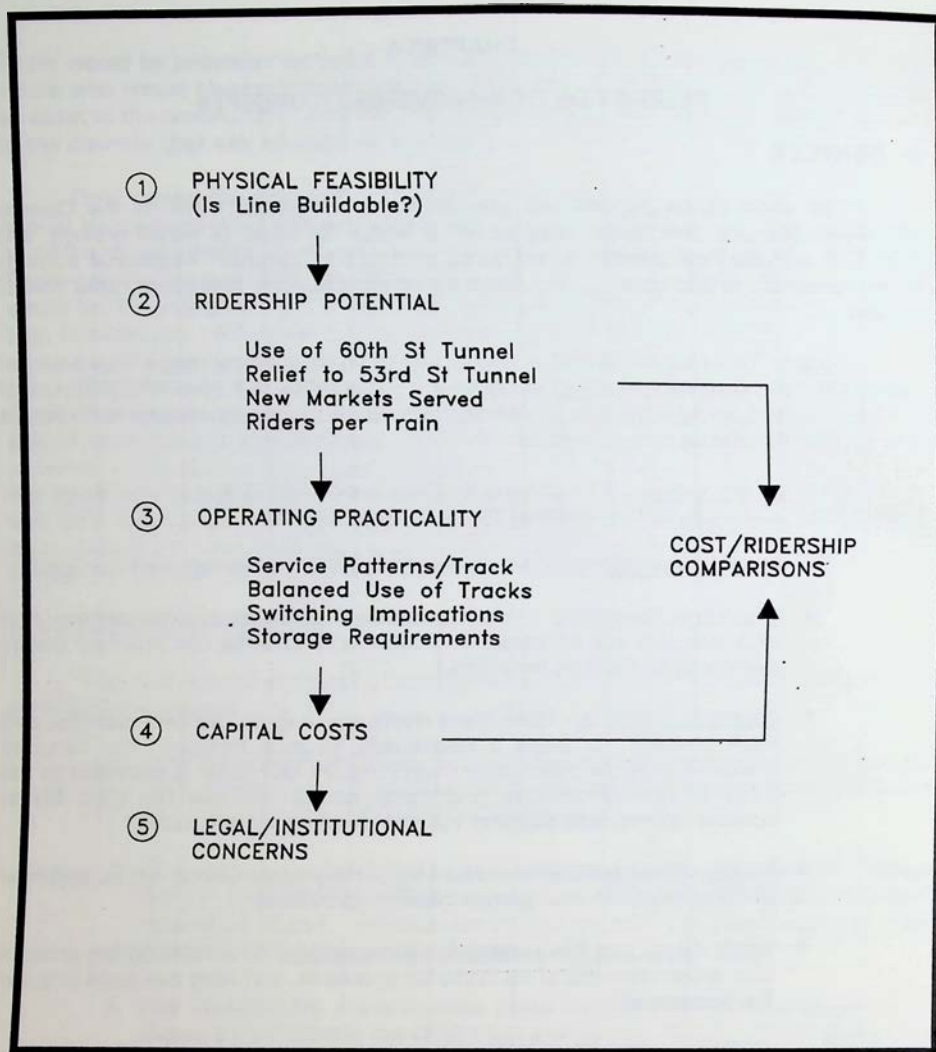


Figure 4-1

Analysis Procedure



3. It should reduce overcrowding in the 60th, 53rd and 42nd Street tunnels, and maximize use of the 63rd Street tunnel.
4. It should provide sufficient capacity for peak-hour travel demands, not only for 2000, but for 2010 as well.
5. It should serve new markets, and it should reduce journey times for existing markets as well.
6. It should provide a reasonable relationship between the costs incurred and the services afforded.
7. It should be affordable, and, if unusually high capital costs are involved, it should be capable of staged or incremental development.
8. It should not pose major environmental problems.

Underlying Assumptions. The analyses assume that the 63rd Street - Queens Boulevard connection (the "Northern Boulevard Connection") will be built as currently planned. Although the planned local-express connection falls far short of the Queens Bypass in relieving overcrowding, it does improve conditions. To defer this project to search for an "ideal" solution will be counterproductive. The resulting delay (as in 1979) would set the project completion back another decade, during which period costs will escalate, and cost-effectiveness will diminish.

It is, of course, realized that many of the "bypass options" do not require the Northern Boulevard Connection. This has been noted in several cases.

1. Ridership Projections. The comparative analysis of options are based upon a year 2000 ridership demand of 130,000 AM peak hour inbound passenger using the four Queens-Manhattan subway tunnels (Chapter 2). By about 2015, the number of riders could approach 145,000.

The 130,000 riders were allocated to the various routes and river crossings, using the MTA Environmental Impact Statement assignments as a base, and making adjustments to reflect the number of trains operated on individual routes, the attractiveness of the service, and the characteristics of the areas served by proposed extensions. Existing station boardings in proximate areas provided a further indication of ridership potentials of proposed stations.

The total inbound ridership was increased for several options to reflect the penetration of new market areas, and/or the expansion of subway capacity.

2. Capacity Requirements. The schedule-design capacities of 1400 persons per IND/BMT train and 1210 persons per IRT train were applied to the number of trains operating under each option across the East River. Based on 28 trains per track per hour, this results in the following capacities:

|             |         |
|-------------|---------|
| 63rd Street | 39,200  |
| 60th Street | 39,200  |
| 53rd Street | 39,200  |
| 42nd Street | 33,880  |
| <hr/>       |         |
| Total       | 151,480 |

Thus, the four tunnels, if fully utilized, can comfortably accommodate the anticipated AM inbound riders well beyond 2010. In many options, however, only 14 to 21 trains per hour are able to use the 63rd Street tunnel, resulting in capacities of 131,880 to 141,680 riders; these capacities would comfortably accommodate riders to about 2005.

3. Operating Guidelines. The following were used in formulating the various options. They reflect NYCTA operations planning philosophy.

- Operating plans were developed for the inbound service to Manhattan during the AM peak hour. These plans were derived for comparative purposes. They are based on the existing subway service pattern and the provision of not more than two basic services per trunk-line route.
- Subway service would operate at a minimum 2-minute headway during the peak of the peak hour. This translates into a maximum practical capacity of 28 trains per track per hour for planning purposes, (allowing for some "slack" in the schedule).
- The three existing tunnels would operate at their practical capacity of 28 trains per hour. (Using 28 rather than 30 trains as a capacity criteria allows for peaking of ridership within the rush hour.)
- The number of trains using the 63rd Street tunnel would vary from 14 to 28, depending upon the specific option. Some options would operate 21 trains per hour through the tunnel.
- The E and F express services would operate via the 53rd Street tunnel (except for one variation of the Express-Local Connection option). The F express service could be shifted to 63rd Street in several options; while this could increase the numbers of riders using 63rd Street, it could also increase loads on the remaining express service via 53rd Street.

- Operating Queens Boulevard expresses via 63rd Street and locals via 53rd Street could also apply to many options. However, these specific impacts were only assessed for the planned Queens Boulevard connection.
- The added service in Queens through the 63rd Street tunnel would be linked with the existing Q services that terminate at 21st Avenue. It would be routed via the Sixth Avenue Local in Manhattan since there is insufficient capacity on the Sixth Avenue Express track for B, D, and the increased Q services. The services from Upper Manhattan are limited to the 6th Avenue express track.
- If the Q service is rerouted to Upper Manhattan via 8th Avenue, then the 63rd Street service would be linked with the B service, operating via the 6th Avenue Local in Manhattan. If both the B and Q operate to Upper Manhattan in the peak hours, then a new "V" service would operate via the 6th Avenue Local to 2nd Avenue. Manhattan.
- Turnback of some V/Q trains at 2nd Ave Manhattan may be necessary to avoid overloading the Manhattan Bridge. This would enable Brooklyn "Q" service to use the express track, if desired, in some options and the 2nd Ave V turnback service to use the local track. (This latter requirement, however, was not identified in the various service plans.)
- Changes in Queens-Brooklyn service linkages may be required in some cases because of track limitations.
- In some options, a second service would operate through the 63rd Street tunnel. This service would generally operate via the Broadway-Seventh Ave Line (local or express) to Whitehall Street.
- The Queens - Brooklyn "G" service is cut back at Court Square during peak hours in many of the options. In some cases, however, further refinements of operating plans might allow this service to continue to Queens Plaza or 71st Avenue. It should, however, be realized that better use is made of Queens Boulevard local tracks when the G service is cut back.
- The main focus is on increasing capacity for Queens-Manhattan trips. This takes precedence over maximizing system connectivity within Queens.
- Improvements at the Harold Interlocking and the New West Side storage yard should allow the number of peak hour trains on the Long Island Rail Road to be increased.



4. Costs. Order-of-magnitude, capital costs were derived from a variety of sources and adjusted to 1990 levels. (a) Estimates for the Bypass and Bypass-related options were drawn from the July, 1981, Queens Transit Alternatives study. (b) Cost for the Northern Boulevard connection were based upon those contained in the May, 1990, Draft E.I.S. (c) Other costs were based upon the following unit values, subject to engineering judgment where complex construction is required.<sup>1</sup> These costs include track, signals, and stations.

|                              | Cost / 2 Track Mile (in millions \$) |
|------------------------------|--------------------------------------|
| Subway                       | \$250-\$350                          |
| Elevated Structure           | \$75                                 |
| New Elevated Embankment-Only | \$50                                 |
| Existing Embankment or Grade | \$25                                 |

Rail car costs were not estimated, since they will depend in part of the amount of interlining possible, and detailed schedule development.

Options Analyzed. The options analyzed are summarized in Table 4-1.

- Options 1-1 through 1-7 build upon the planned 63rd Street tunnel connection to the Queens Boulevard line. They include the connection itself (Option 1-1), 3-1 reverse running (Option 1-2), connecting the G line to the 63rd St tunnel (Option 1-3), 60th Street joint running over the Flushing line express track (Options 1-4 and 1-5), a reversible 5th track or revised operating plan through the Roosevelt Ave station with a connection to the Rockaway line (options 1-6 and 1-7).
- Options 2-1 through 2-9 involve the Queens Bypass in its original or modified form, including possible subway extensions to east and southeast Queens, the Rockaways, LaGuardia, and JFK. They include: the Queens Bypass (Options 2-1, 2-2, 2-3), connection of the Bypass to a JFK and Rockaway line (Option 2-4), a connection to Archer Avenue and southeast Queens (Options 2-5), a connection to a LIE - east central Queens line (Option 2-6), a truncated bypass to Grand Avenue (Option 2-7), a Northern Boulevard extension to LaGuardia (Option 2-8), and a direct LaGuardia extension (Option 2-9).

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<sup>1</sup> A review of recent subway construction costs shows wide variation depending upon the type and complexity of construction and local conditions. Costs around \$300 million per mile in 1990 dollars have been reported for the Cambridge-Aleurf extension and for the first phase of the Los Angeles Red Line. Accordingly, a cost of \$250 million was used for subway construction in Queens and \$350 million in Manhattan.

Table 4-1

## Summary of Options Analyzed

| 1. 63rd - Queens Blvd Connection |                                                                              | 2. Bypass Options |                                                                     | 3. LIRR Options |                                                                             |
|----------------------------------|------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------|
| 1-1                              | 63rd St tunnel Express/Local connection only                                 | 2-1               | Single track bypass                                                 | 3-1             | LIRR - Long Island City transfers                                           |
|                                  |                                                                              | 2-2               | Double track bypass                                                 | 3-2             | 63rd St - connection to Montauk branch                                      |
| 1-2                              | 3:1 Reverse Signaling                                                        | 2-3               | Double track bypass without 71st station                            | 3-3             | Conversion of Pt Washington branch                                          |
| 1-3                              | GG connection - 63rd                                                         | 2-4               | Connection to Rockaway line and JFK                                 | 3-4             | Conversion of main line to subway operation in Queens, with Jamaica flyover |
| 1-4                              | 60th St - IRT joint running                                                  | 2-5               | Queens Bypass with South East Queens extension                      | 3-5             | LIRR connection to GCT/midtown                                              |
| 1-5                              | 60th St - IRT joint running with IRT realignment                             | 2-6               | Connection to LIE East Central Queens Line                          |                 |                                                                             |
| 1-6                              | Reversible 5th track Roosevelt Ave - 74th St with Rockaway branch connection | 2-7               | Truncated Bypass at Grand St/Roosevelt (possibly with Rockaway Br.) |                 |                                                                             |
| 1-7                              | Revised service pattern at Roosevelt Ave with Rockaway connection            | 2-8               | Northern Blvd - LGA extension                                       |                 |                                                                             |
|                                  |                                                                              | 2-9               | LaGuardia extension only                                            |                 |                                                                             |

3. Options 3-1 through 3-5 involve use of Long Island Rail Road rights-of-way. They include a 63rd Street - Long Island City transfer (Option 3-1), a 63rd Street connection to a Montauk Branch - Archer Ave line (Option 3-2), conversion of the Port Washington Branch to subway operation (Option 3-3), conversion of the Main-line / southeast Queens line to subway operation (Option 3-4), and an LIRR extension to midtown (Option 3-5).

## **B. DESCRIPTION OF OPTIONS**

This section describes and assesses each option. It contains sketches, operating plans, ridership forecasts, and cost estimates. It identifies the general features, strengths and weaknesses of each option.

### **1 - 63rd STREET QUEENS BOULEVARD OPTIONS.**

The first series of options build upon the planned connection between the 63rd Street tunnel and the Queens Boulevard subway line. They show how, with various physical changes and operating strategies, the number of peak hour trains using the 63rd Street tunnel could increase from 14 to 21.

#### **Option 1-1. Queens Boulevard Local/Express Connection.**

1. Plan Features. this option provides a two-track connection between the east end of the 63rd Street line and the existing local and express tracks of the Queens Boulevard line. It also includes a four-track two-level "bellmouth" structure for possible future extensions of both the subway and LIRR (i.e., to a new subway yard or to the Bypass). Figure 4-2 shows how this subway service connection would be made.

- A four-track subway tunnel would be built from the existing bulkhead (at 29th Street and 41st Ave) under Northern Boulevard. The four tracks (two upper level NYCTA, two lower level, LIRR) would be capped to allow for future extension. This is sometimes referred to as the bellmouth.
- A double track subway tunnel would connect with the two existing tracks of the 63rd Street line and would curve in a south-easterly direction to about 40th Road at which point the two tracks would separate into single track tunnels.
- One of the single-track subway tunnels would connect to the existing eastbound express track near 33rd Street. The other single-track subway tunnel would connect with the existing westbound local tunnel.



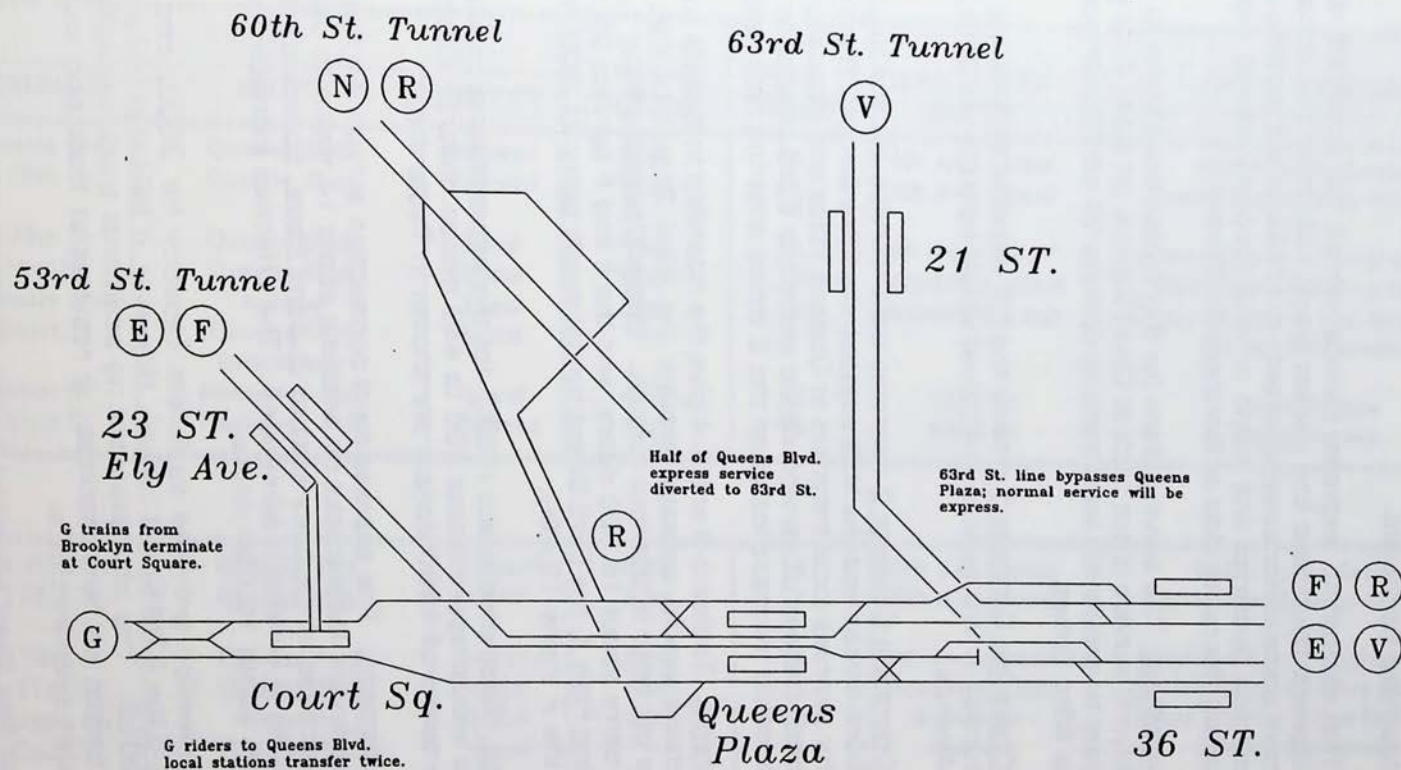


Figure 4-2

Planned Local Express Connection (Does not show pocket tracks)

- An additional single track tunnel would be built as a westbound Queens Boulevard local bypass track from about 40th Road to 40th Avenue at Northern Boulevard.
- The eastbound express service would be rerouted via the existing Queens Boulevard line pocket track. Most of the construction would take place under existing streets or MTA-owned parking lots. However, several buildings and some private property would have to be taken along the north side of Northern Boulevard.

2. Service Plan. The service plans for this option are shown in Table 4-2. The Queens-Brooklyn G service is cut back at Court Square (at least during peak periods). This is necessary to enable the local track to operate 14 additional inbound trains into Manhattan via 63rd Street.

- Operating Concept 1 retains the E/F express service via the 53rd Street tunnel. A V/Q service (14 trains) would operate via 63rd Street and Sixth Avenue.
- Operating Concept 2 operates the F service via the local tracks through 53rd Street and the V/Q express via 63rd Street. It minimizes the need for express-local transfers at Queens Plaza and Roosevelt Avenue, since both classes of service would serve the 53rd-Lexington area. However it could increase loads on the E trains entering Manhattan.

3. Ridership. Tables 4-3 and 4-4 give the ridership forecasts for each route and tunnel. 14 trains would operate through the 63rd Street tunnel, resulting in 98 inbound trains per hour in the four tunnels. Under Operating Plan 1, the 63rd Street tunnel would carry about 16,000 riders, and the E and F service 22,000 riders each. Under Operating Plan 2, the 63rd Street tunnel would carry 21,000 riders, the E trains 25,000, and the F trains 18,000.

4. Costs. Estimated costs (1990) for the express-local connection, exclusive of rail vehicles would approximate 400 to 450 million dollars. Costs set forth in the Draft E.I.S. in terms of 1990 dollars are shown in Table 4-5.

5. Assessment. The express-local connection almost doubles the capacity of the Queens Boulevard local tracks by enabling about 14 trains to use the 63rd Street tunnel. The increase in capacity east of Queens Plaza, however, is somewhat less, since the existing G service is eliminated. The effective increase in capacity east of Queens Plaza is about 16,000 riders.

The connection provides sufficient capacity for 2000, and it would reduce overcrowding in the 53rd Street tunnel. However, it falls short of providing sufficient capacity for 2010. The plan provides no additional track capacity east of Queens Plaza, and it serves no new markets. It requires at least one walking transfer for Queens-Brooklyn subway riders.

The plan has been accepted by the NYCTA. It is a minimum-cost minimum-benefit alternative.

Table 4-2

**Operating Plan - Option 1-1: Northern Boulevard Connection  
(Inbound AM Peak Hour)**

a.

| LINE | QUEENS       |                          |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE | OTHER TERMINAL                       |
|------|--------------|--------------------------|---------|-------------------|----------------|--------------------|--------------------------------------|
|      | TERMINAL     | ROUTE                    | SERVICE |                   |                |                    |                                      |
| E    | Jamaica Cntr | Queens Blvd              | Express | 53rd              | 14             | 8th Ave - local    | World Trade Center                   |
| G    | 179th St     | Queens Blvd              | Express | 53rd              | 14             | 6th Ave - local    | Coney Island/Kings Hwy via<br>Culver |
| V/Q  | 179th St     | Queens Blvd              | Local   | 63rd              | 14             | 6th Ave - local*   | Brighton Beach via Brighton Exp*     |
| R    | 71st St      | Queens Blvd              | Local   | 60th              | 14             | Broadway - local   | 95th St via 4th Ave (local)          |
| N    | Ditmars Blvd | Astoria                  | Local   | 60th              | 14             | Broadway - exp     | Coney Island via Sea Beach Exp       |
| G    | Court St     | Queens Bkln<br>crosstown | Local   | --                | 6              | -----              | Smith - 9th streets                  |
| 7    | Main St      | Roosevelt Ave            | Local   | 42nd              | 14             | 42nd St            | Times Square                         |
| 7    | Main St      | Roosevelt Ave            | Express | 42nd              | 14             | 42nd St            | Times Square                         |

b.

|     |              |                          |         |      |    |                  |                                      |
|-----|--------------|--------------------------|---------|------|----|------------------|--------------------------------------|
| E   | Jamaica Cntr | Queens Blvd              | Express | 53rd | 14 | 8th Ave - local  | World Trade Center                   |
| G   | 179th St     | Queens Blvd              | Local   | 53rd | 14 | 6th Ave - local  | Coney Island/Kings Hwy via<br>Culver |
| V/Q | 179th St     | Queens Blvd              | Express | 63rd | 14 | 6th Ave - local* | Brighton Beach/Brighton Exp          |
| R   | 71st St      | Queens Blvd              | Local   | 60th | 14 | Broadway - local | 95th St via 4th Ave (local)          |
| N   | Ditmars Blvd | Astoria                  | Local   | 60th | 14 | Broadway -       | Coney Island via Sea Beach Exp       |
| G   | Court St     | Queens Bkln<br>crosstown | Local   | --   | 6  | express<br>----- | Smith - 9th streets                  |
| 7   | Main St      | Roosevelt Ave            | Local   | 42nd | 14 | 42nd St          | Times Square                         |
| 7   | Main St      | Roosevelt Ave            | Express | 42nd | 14 | 42nd St          | Times Square                         |

\* Via B and 6th Ave local, if Q is rerouted to Upper Manhattan. All V/Q service options may involve turning some trains back at 2nd Avenue-Manhattan.



Table 4-3

Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-1: 63rd Street Tunnel - Express Local Connection

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 3000                                               | subtotal    | 14     | 19,600   | 16,000              | 0.82         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 22,000              | 1.12         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 22,000              | 1.12         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 44,000              | 1.12         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 131,880  | 130,000             | 0.99         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

Table 4-4

Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-1: 63rd Street Tunnel - Express Local Connection

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 2500                                               | subtotal    | 21     | 19,600   | 21,000              | 1.07         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 12,000              | 0.61         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 30,000              | 0.76         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 25,000              | 1.28         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 18,000              | 0.92         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 43,000              | 1.10         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 131,880  | 130,000             | 0.99         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

Table 4-5

**Estimated Costs of Planned Connection  
(In Thousands of Dollars)**

| ITEM                    | LOCAL<br>CONNECTION | LOCAL-EXPRESS<br>CONNECTION |
|-------------------------|---------------------|-----------------------------|
| Construction            | \$ 216,215.00       | \$ 283,285.00               |
| Track Work              | 3845.00             | 12,465.00                   |
| Signals-Electrification | 43,791.30           | 54,911.30                   |
| Property Acquisition    | 29,650.00           | 18,650.00                   |
| Subtotal                | 293,502.30          | 369,311.30                  |
| Subtotal, 1990 dollars  | (322,852.53)        | (406,242.46)                |
| Rail Vehicles           | 116,200.00          | 485,511.30                  |
| Total                   | 409,701.30          | 485,511.30                  |
| Total, 1990 dollars     | (450,671.60)        | (534,062.43)                |

Source: Alternatives Analysis Supplement Draft Environmental Impact Statement Options Study, May, 1990.



### Option 1-2. Reverse Signaling.

1. Plan Features. This option suggested by the NYCTA, calls for "reverse signaling" of the Queens Boulevard express tracks between Queens Plaza and 71st Street. This would make it possible to operate three tracks in the heaviest direction of travel, leaving one track for service in the opposite direction. A new service yard would be built in Sunnyside Yards to provide the necessary train storage.

2. Service Plan. The service plan for the option is shown in Table 4-6. A V/Q Queens Boulevard express via the Sixth Avenue local from 179th Street (14 trains) and a W Queens Boulevard-Broadway Local from 71st (7 trains) would operate via 63rd Street. The Queens-Brooklyn G service (7 trains) would continue to operate to and from 71st. There would be no change in other subway services.

3. Ridership. Table 4-7 gives anticipated trains and riders by route. The reverse signaling would allow 105 trains to enter Manhattan in the AM peak hour - 21 would use the 63rd Street tunnel. The total trans-river capacity would approximate 142,000 people as compared with an estimated year 2000 ridership of 134,000. The E and F lines would carry 20,000 riders each while the V/Q expresses would carry 18,000. Thus, the overcrowded conditions would be effectively reduced.

4. Costs. Costs for the reverse signaling and the new storage yards are estimated at \$50 million for signaling and up to \$700 million for the yard. These costs are in addition to those for Option 1-1.

5. Assessment. The reverse running builds upon long established operating practice (i.e., Third Avenue 'L'). It provides substantial additional capacity for the heavily traveled Queens Boulevard Corridor thereby relieving the overcrowding on the existing express services. It calls for 21 trains through the 63rd Street tunnel. However, this number could be increased to 28 by fully utilizing the additional express track.

On the surface, this operating concept appears to be a cost-effective means of maximizing passenger throughput. However, it has several problems that must be recognized.

1. Queens Boulevard service in the off-peak direction is limited to a single track. This results in fewer trains and the elimination of express service. It also downgrades access to the Jamaica central business district and the Kew Gardens Civic Center.
2. Breakdowns in the single track would result in a complete disruption of service.
3. Scheduling of service becomes more complex and intricate.
4. The 3-1 operating concept requires one additional storage yard. Without such a yard, the plan is not achievable.

Table 4-6

**Operating Plan - Option 1-2: Reverse Signaling  
(Inbound AM Peak Hour Direction)**

| LINE             | QUEENS       |                                       |                                       | RIVER<br>CROSSING | PEAK<br>TRAINS  | MANHATTAN<br>ROUTE         | OTHER TERMINAL                                  |
|------------------|--------------|---------------------------------------|---------------------------------------|-------------------|-----------------|----------------------------|-------------------------------------------------|
|                  | TERMINAL     | ROUTE                                 | SERVICE                               |                   |                 |                            |                                                 |
| E                | Jamaica Cntr | Queens Blvd                           | Express                               | 53rd              | 14              | 8yth Ave local             | World Trade Center                              |
| F                | 179th St     | Queens Blvd                           | Express                               | 53rd              | 14              | 6th Ave local              | Coney Island/Kings Highway<br>via Culver        |
| V/Q <sup>1</sup> | 179th St     | Queens Blvd                           | Local to 71st<br>Express from<br>71st | 63rd              | 14 <sup>3</sup> | 6th Ave local <sup>1</sup> | Brighton Beach<br>via Brighton Exp <sup>1</sup> |
| W                | 71st         | Queens Blvd                           | Local                                 | 63rd              | 7 <sup>2</sup>  | Broadway local             | Whitehall St                                    |
| R                | 71st         | Queens Blvd                           | Local                                 | 60th              | 14              | Broadway local             | 95th St via 4th Ave local                       |
| N                | Ditmars Blvd | Astoria                               | Local                                 | 60th              | 14              | Broadway<br>express        | Coney Island via<br>Sea Beach Exp               |
| G                | 71st         | Queens Bkln<br>crosstown <sup>3</sup> | Local                                 | --                | 7               | ---                        | Smith - 9th                                     |
| 7                | Main St      | Roosevelt Ave                         | Local                                 | 42nd              | 14              | 42nd St                    | Times Square                                    |
| 7                | Main St      | Roosevelt Ave                         | Express                               | 42nd              | 14              | 42nd St                    | Times Square                                    |

<sup>1</sup> Via B and 6th Ave local, if Q is rerouted to Upper Manhattan. Some trains may be turned back at 2nd Avenue-Manhattan.

<sup>2</sup> Could be 14 if service stops at Court Square.

<sup>3</sup> Could be increased to 21 trains if demand arises.

Table 4-7

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-2: Reverse Running**

| TUNNEL            | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|                   |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd              | Q        | 3000                                               | V/Q         | 14     | 19,600   | 18,000              | 0.92         |
|                   |          |                                                    | W           | 7      | 9,800    | 7,000               | 0.71         |
|                   | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 25,000              | 0.85         |
| 60th              | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|                   | R        | 18,000                                             | R           | 14     | 19,600   | 15,000              | 0.77         |
|                   | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 33,000              | 0.84         |
| 53rd              | E        | 26,500                                             | E           | 14     | 19,600   | 20,000              | 1.02         |
|                   | F        | 26,500                                             | F           | 14     | 19,600   | 20,000              | 1.02         |
|                   | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 40,000              | 1.02         |
| 42nd              | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|                   | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL       |          | 130,000                                            | Grand Total | 105    | 141,680  | 134,000             | 0.95         |
| Note: 2010 Demand |          |                                                    |             |        |          | 145,000             |              |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12; 63rd Street increased to 3000.



### Option 1-3. 63rd Street Connection to Queens - Brooklyn Crosstown Line.

1. Plan features. This concept connects the 63rd Street subway with both the Queens Boulevard and Queens-Brooklyn crosstown lines. It is designed to (1) provide direct service between Manhattan and North Brooklyn and (2) increase utilization of the 63rd Street tunnel.

Figure 4-3 shows the alignment possibilities for the connection. Option 1 follows 23rd Street, passing under the IRT, 53rd Street, and 60th Street subway lines, and providing a new Court Square station. Option 2 involves modifying the interchange with the Queens Boulevard line to enable the crosstown connection to follow 27th Street or some other Street to 41st Avenue. Both of these connections are very difficult to build and would require a detailed engineering study to access physical feasibility and constructability.

2. Service Plan. The operating plan is similar to that for Option 1-1. However, the Queens Brooklyn G service (7 trains) would operate via 63rd Street and Broadway to Whitehall Street. (It could use either the local or express tracks on Broadway.) Thus, some 21 inbound trains would use the 63rd Street tunnel in the AM peak hour.

3. Ridership. Table 4-8 gives anticipated ridership by route. The G service would carry about 5000 riders through the 63rd Street tunnel - about 3000 diverted from the 42nd and 53rd crossings and about 2000 "new" riders from the Greenpoint area (including possible diversions from the 14th Street Canarsie line). Consequently, ridership on the E, F and 7 trains are slightly less than for the Northern Boulevard connection alone. E and F trains would carry 21,000 riders each.

4. Costs. Costs are estimated at \$250 million. (These costs would be in addition to those for the Northern Boulevard connection).

5. Assessment. This concept provides direct subway service to midtown from Greenpoint and other parts of north Brooklyn. This could increase development potentials in Greenpoint, especially along a revitalized waterfront. Further engineering analyses should assess the possibility of linking the G service with the 60th Street tunnel instead.

The seven additional "G" trains using the 63rd Street tunnel would be lightly patronized (i.e., about 5000 riders versus 9800 capacity). At the same time the construction costs would be substantial resulting in a high cost per rider served, and per passenger diverted from 53rd Street.

### Option 1-4. 60th Street Tunnel Connection to Flushing Line.

1. Plan Features. The 63rd Street/Queens Boulevard connection will reduce the peak hour overloads on the QBL but will have little or no effect on relieving the Flushing line. Reducing overloads on the Flushing line (about 12% by 2000 to 2005) requires innovative capacity enhancement measures, such as operating express service over the middle track and into the 60th Street tunnel.

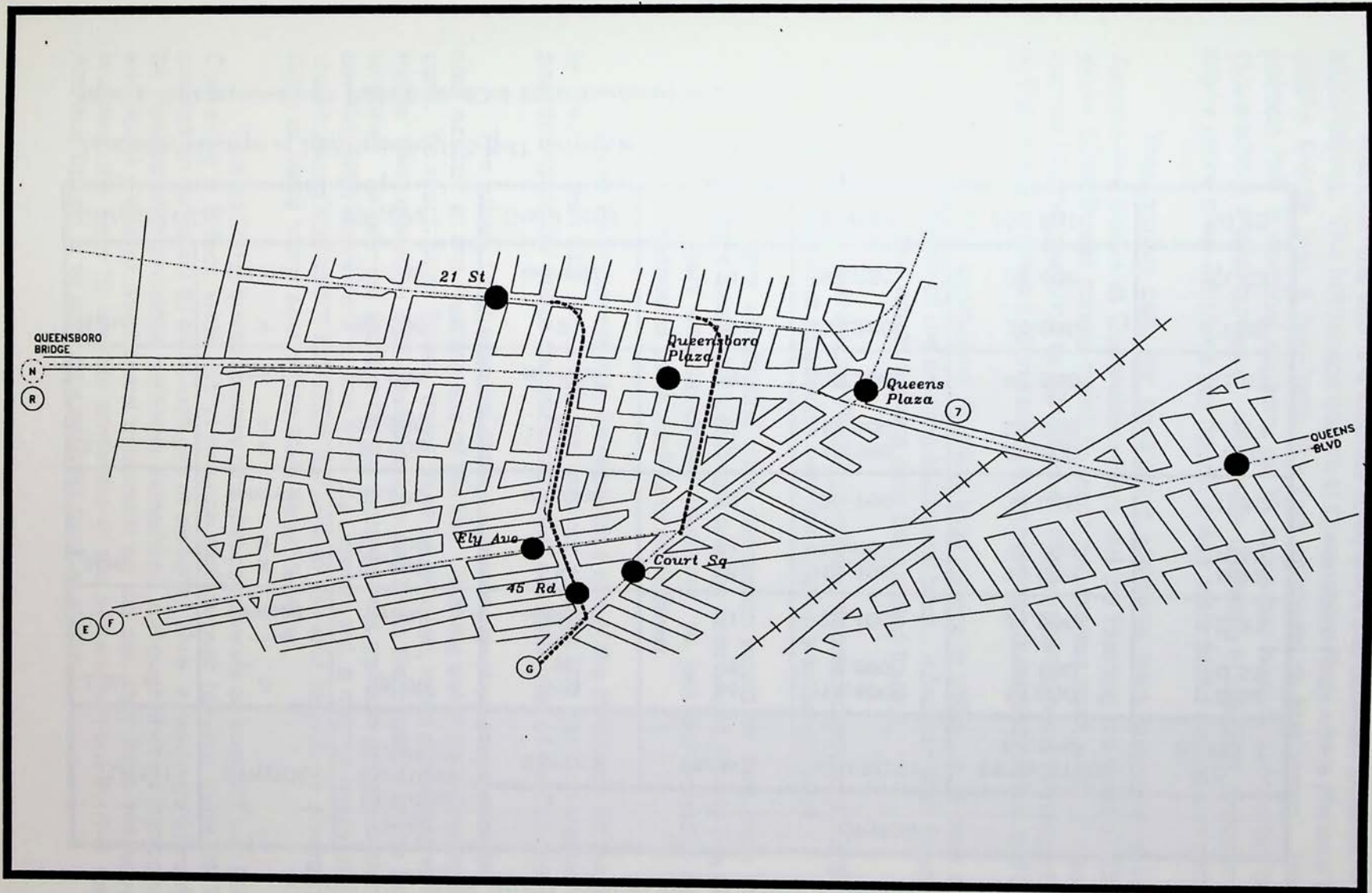


Figure 4-3

Option 1-3: G Extension to 63rd Street

Table 4-8

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-3: 63rd Street Connection to Queens Boulevard and GG**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 16,000              | 0.82         |
|             |          |                                                    | W           | 7      | 9,800    | 5,000               | -0.51        |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 21,000              | 0.71         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.87         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.07         |
| 42nd        | 7        | 38,000                                             | 7           | 14     | 33,880   | 35,000              | 1.03         |
|             | subtotal | 38,000                                             | subtotal    | 14     | 33,880   | 35,000              | 1.03         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 132,000             | 0.93         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.



The Flushing line is a discrete three-track line between Queensboro Plaza and Main Street. The bottleneck occurs at Queensboro Plaza where the local and express tracks merge into a two-track line that continues to Manhattan. This two-track portion has a nominal capacity of 28 trains per hour in each direction. East of Queensboro Plaza, however, two tracks operating in the peak direction could carry many more than 28 trains per hour if a way were found around the bottleneck.

This option calls for developing additional track connections between the Astoria-line tracks at Queensboro Plaza and the Flushing line west of 33rd Street to allow 60th Street tunnel trains to reach the express track without interfering with normal Flushing service to 42nd Street. The suggested track rearrangement, shown in Figure 4-4 creates a four-track section between Queensboro Plaza and 33rd Street.

- The eastbound Flushing local service is shifted to a new track to the south of the existing eastbound track. 42nd and 60th Flushing express trains would operate over the existing track.
- The westbound Flushing local and express trains to 42nd Street would continue to operate over the existing westbound track.
- A new westbound track connection would be built from the express track under the local track and the northbound Astoria line track, using in part an abandoned trackway, to join the existing Astoria line westbound track leading to 60th Street.

Some train storage may be required; a part of the third track on the Astoria line or tracks near City Hall could be used for storage. The track connections make it possible to better utilize the track capacities east and west of the Queens Plaza area.

The other major physical change involves providing storage for the additional cars needed at the Flushing end of the line. Flushing trains are stored in the Corona yard. To reach Main Street, trains must be reversed, often conflicting with revenue trains; this operation that causes delays and limits the capacity of the Main Street terminal. To provide storage for the extra express trains in a manner that does not conflict with movement to and from the Corona yard, it may be necessary to extend the Flushing subway a sufficient distance to the east to provide storage for about eight or more trains east of the Main Street terminal.

This option requires subway cars that can operate on both IRT and BMT tracks. Operating a 9-foot wide IRT in revenue service over ten-foot wide BMT territory creates an extra six to eight-inch gap at stations. Thus, a new type of vehicle would be needed that provides carborne extenders. Although these extenders place an additional piece of mechanical equipment on the car, they have the advantage of enabling the cars to operate anywhere in the system without further restrictions. Another option is to provide a gauntlet track at stations.

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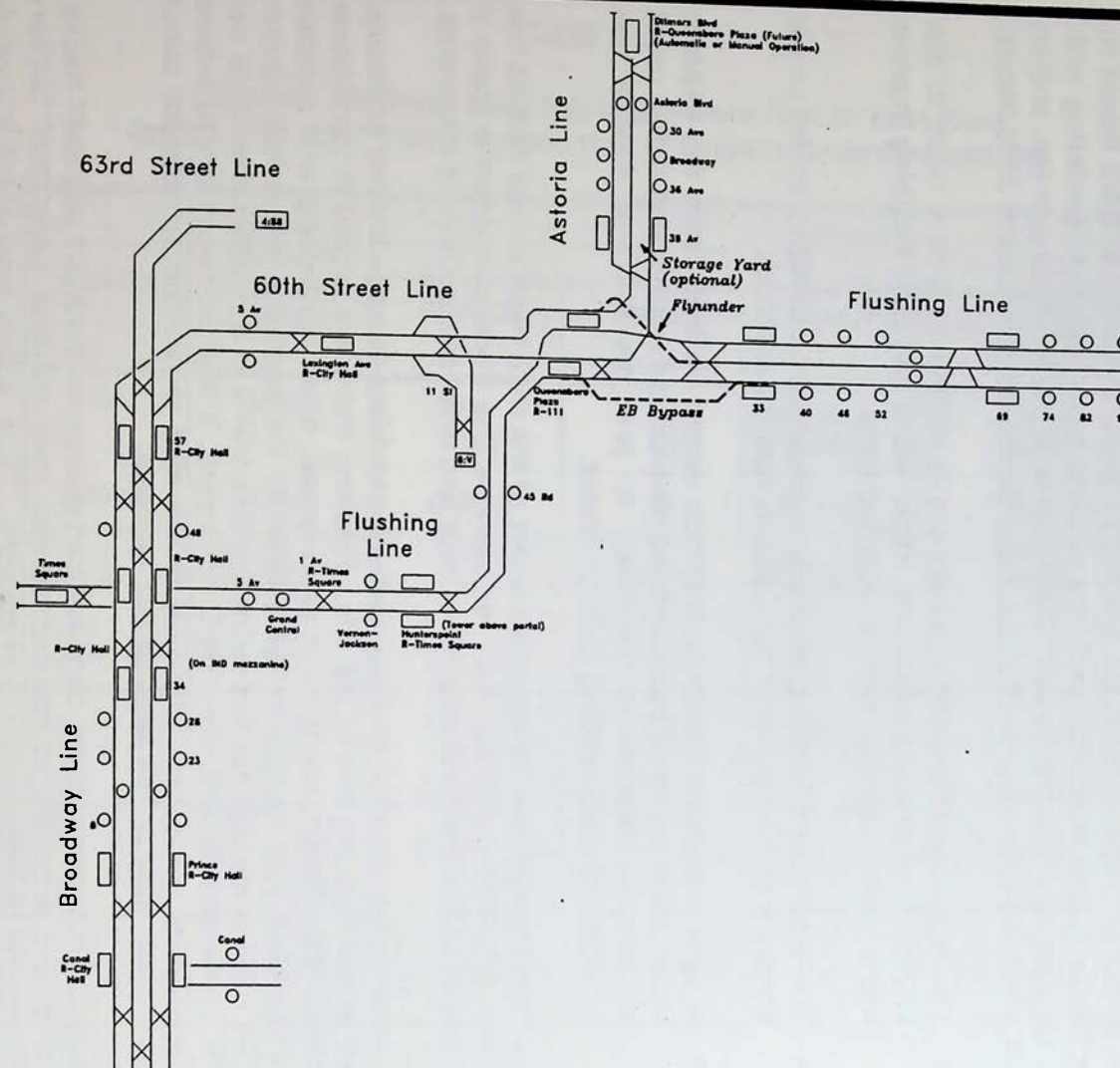


Figure 4-4

Option 1-4: 60th Street Connection to Flushing Express Track

2. Service Plan. The service plan is shown in Table 4-9. A new "U" (or 8) express service, 7 trains, is superimposed on the existing Flushing service. The trains would operate over the express track between Main Street and Queensboro Plaza, and via the 60th Street tunnel and Broadway local to a Lower Manhattan terminal at Whitehall Street (or possibly the lower level of the City Hall station). These trains would be fed into the Main Street terminal directly from the proposed new storage tracks. They would use the modified track connections at Queensboro Plaza, and thereby not interfere with normal Flushing service. (The 7 new trains would share the express tracks with 14 number 7 express trains; this is well within the capacity of the express track.) Service in the off-peak direction would terminate at Queensboro Plaza.

Some of the R service now operating through the 60th Street tunnel would use the Flushing line. This makes it possible to provide a new W/R local service (7 trains) from 71st-Continental Avenue via the 63rd Street tunnel. In Manhattan, these trains could utilize the Broadway express tracks. As in Option 1-1, a V/Q service (14 trains) would operate via the Queens Boulevard local tracks, and the 63rd Street tunnel, and the 6th Avenue local tracks. Thus, 21 trains would operate into Manhattan via the 63rd Street tunnel during the morning rush hour.

3. Ridership. Table 4-10 gives anticipated A.M. peak hour inbound ridership by route and river crossing. The new "U" (8) service would attract about 9000 riders, of which 2000 are "new" riders (800 from the LIRR). The Flushing line riders would reduce to 31,000 as compared with 38,000 in the "no build" case.

About 24,000 riders would pass through the 63rd Street tunnel, 16,000 on V/Q trains and 8000 on the R trains. 42,000 passengers would use E/F trains through the 53rd Street tunnel. 35,000 passengers would use the 60th Street tunnel (18,000 N riders, 8000 R riders, and 9000 U (8) riders).

4. Costs. Costs are estimated at \$75 million for the track and structural changes at Queensboro Plaza, \$100 million for the short extension of the Flushing line east of Main Street, and about \$25 million to solve the gap problem. (These costs are in addition to those for Option 1-1.)

5. Assessment. This concept has several desirable features: (1) it effectively utilizes the 63rd Street tunnel (24,000 riders versus 16,000 for the Queens Boulevard connection alone, (2) it increases use of the Flushing line and relieves the existing Flushing service, (3) it provides sufficient capacity along the Flushing line for a possible future extension via Kissena Boulevard to about Jewell Avenue. This extension would tap an unserved area in eastern Queens in a less expensive manner than a subway along the Long Island Expressway and help to relieve Queens Boulevard services.

The principal problem is whether suitable rail cars can be provided for combined IRT/BMT operation. Depending upon the ability to store cars on the Astoria line center track, some additional storage might be needed in the Queens Plaza area.



Table 4-9

Operating Plan - Option 1-4: 60th Street Connection to Flushing Line  
(Inbound AM Peak Hour)

| LINE             | QUEENS           |                          |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE         | OTHER TERMINAL                    |
|------------------|------------------|--------------------------|---------|-------------------|----------------|----------------------------|-----------------------------------|
|                  | TERMINAL         | ROUTE                    | SERVICE |                   |                |                            |                                   |
| E                | Jamaica Cntr     | Queens Blvd              | Express | 53rd              | 14             | 8th Ave local              | World Trade Center                |
| F                | 179th            | Queens Blvd              | Express | 53rd              | 14             | 6th Ave local              | Coney Island/Kings Hwy via Culver |
| V/Q <sup>1</sup> | 179th            | Queens Blvd              | Local   | 63rd              | 14             | 6th Ave local <sup>1</sup> | Brighton Beach via Brighton Exp   |
| R                | 71st             | Queens Blvd              | Local   | 60th              | 7              | Broadway local             | 95th St via 4th Ave local         |
| U ('8')          | Main St Flushing | Flushing                 | Express | 60th              | 7              | Broadway local             | Whitehall St                      |
| W/R              | 71st             | Queens Blvd              | Local   | 63rd              | 7              | Broadway express           | 95th St via 4th Ave local         |
| N                | Ditmars Blvd     | Astoria                  | Local   | 60th              | 14             | Broadway express           | Coney Island via Sea Beach Exp    |
| 7                | Main St Flushing | Roosevelt Ave            | Local   | 42nd              | 14             | 42nd St                    | Times Square                      |
| 7                | Main St Flushing | Roosevelt Ave            | Express | 42nd              | 14             | 42nd St                    | Times Square                      |
| G                | Court Street     | Queens Blkn<br>crosstown | Local   | --                | 7              | -----                      | Smith / 9th streets               |

<sup>1</sup> Via B and 6th Ave local, if Q is rerouted to Upper Manhattan. Some trains may be turned back at 2nd Avenue-Manhattan.

Table 4-10

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Options 1-4 & 1-5: 60th Street Connection to Flushing Line**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 16,000              | 0.82         |
|             |          |                                                    | W           | 7      | 9,800    | 8,000               | 0.92         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 24,000              | 0.82         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 7      | 9,800    | 8,000               | 0.87         |
|             |          |                                                    |             | 7      | 9,800    | 9,000               | 0.92         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 35,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.07         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 31,000              | 0.92         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 31,000              | 0.92         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 132,000             | 0.93         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

### Option 1-5. 60th Street Tunnel Connection to Relocated Flushing Line.

1. Plan Features. This option shown in Figure 4-5 is similar to Option 1-4 in that it also involves connecting the 60th Street/Astoria line to the Flushing line to allow peak period peak-direction express service. However, it differs in that it relocates the Flushing line across Sunnyside Yards to eliminate the reverse curves through Long Island City. It includes a new Sunnyside station that is tied to the planned commercial development over the yards. The existing 23rd Street elevated line is removed or used for storage; and the 45th Road station is closed. Minor track changes are made at Queensboro Plaza to enable BMT/Flushing trains to use the existing Flushing line tracks.

2. Service Plan. The service is similar to Option 1-4.

3. Ridership. Anticipated ridership is similar to Option 1-4.

4. Costs. Costs are estimated at \$275 million as follows: \$125 million for the Flushing line relocation, \$25 million for the track and structural changes in the Queensboro Plaza area, \$25 million for the addressing the gap problem, and \$100 million for the short extension of the Flushing line east of Main Street for train storage. (These costs are in addition to those for Option 1-1).

5. Assessment. This concept maximizes the use of both the Flushing line and the 63rd Street tunnel. The increased express service on the Flushing line provides important capacity relief to the existing service and makes it feasible to consider a future expansion via Kissena Boulevard to eastern Queens.

The relocation of the Flushing line through Sunnyside Yards, initially proposed in a Regional Plan Association report to the MTA, serves the new development over Sunnyside Yards, saves IRT-Flushing line riders at least 2 minutes per trip by eliminating the sharp reverse curves, and makes it possible to remove some elevated structures. (The time savings translates into operating cost reductions.)

The relocation, however, poses some problems: (1) Its timing and practicality are contingent on the proposed Sunnyside Yards development; without this project, relocation of the Number 7 line becomes marginal; (2) it eliminates Number "7" service to Queensboro Plaza and Court Square; (3) it eliminates the transfer at Queensboro Plaza between the Flushing and Astoria line (although the need becomes reduced by the proposed "U/8" service); and (4) construction would take place over operating AMTRAK and Long Island Rail Road tracks, many with overhead wires.

The concept depends upon the ability to provide subway cars that can run in revenue services on both the IRT and BMT lines.



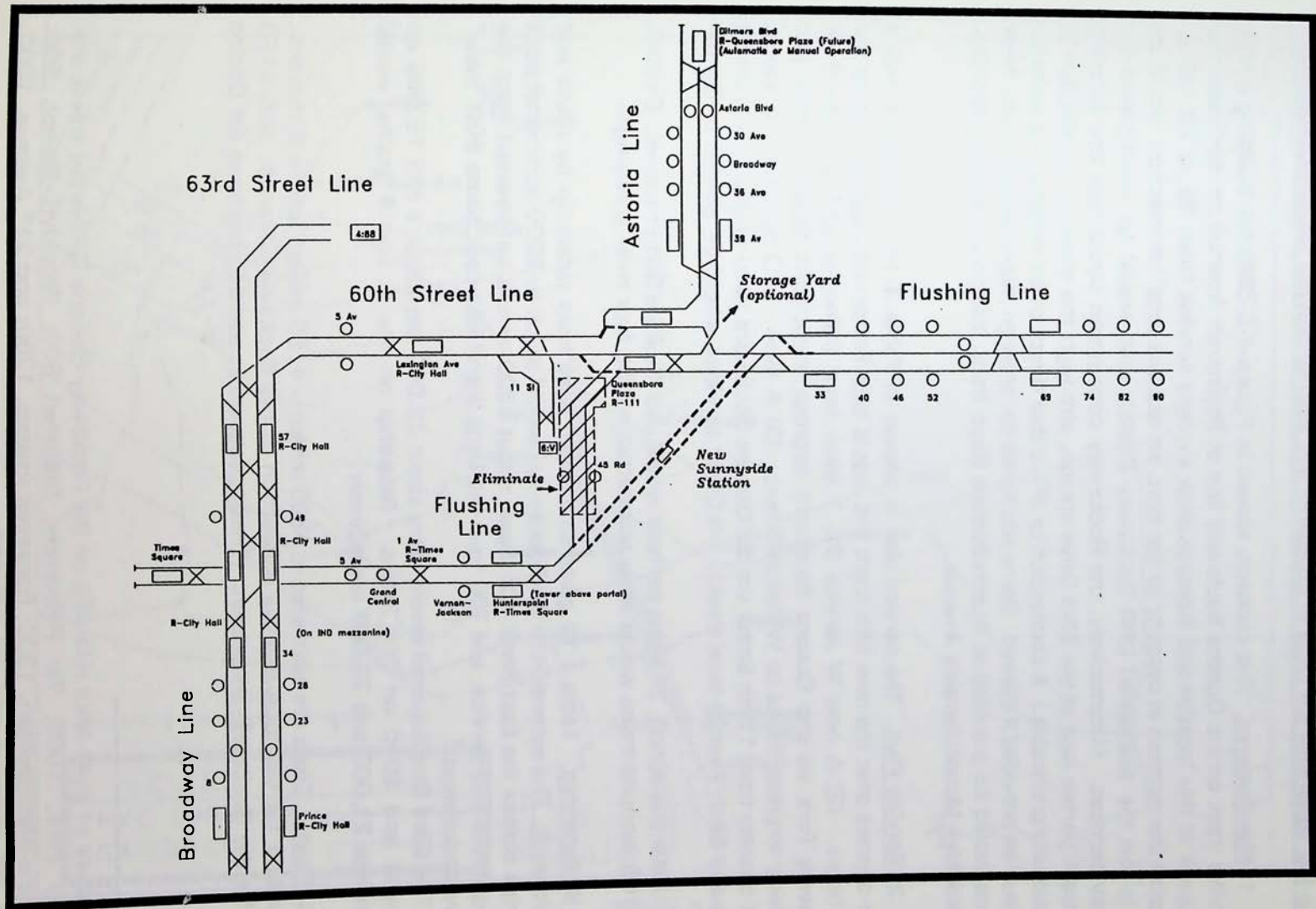


Figure 4-5

Option 1-5: Flushing Line Realignment with 60th Street Tunnel Running to Flushing

#### **Option 1-6. Reversible 5th Track at Roosevelt Ave with Rockaway Branch Connection.**

1. Plan Features. This concept, shown in Figure 4-6 calls for building a fifth reversible track on the Queens Boulevard line at Roosevelt Avenue to eliminate the bottleneck at this location and increase peak express service from 28 to 35 trains. To realize the increase in capacity to the east, an express-local connection would be built to join the abandoned LIRR Rockaway Branch that would be reactivated for subway services. (Alternatively, the Rockaway connection could use the existing local track portals east of the 63rd Drive station, although the express connection is operationally preferable.) A connection to JFK either direct or by means of a transfer link could be provided if desired. Some additional car storage might be required. New stations would be provided at Austin/Burnsin Rego Park, Yellowstone/Metropolitan, and Brooklyn Manor/Jamaica Avenue.

2. Service Plan. The service plan is shown in Table 4-11. (1) The F trains would operate over the new fifth track and would skip Roosevelt Avenue during the peak hours. (2) A new W service (No 7 peak hour trains) would operate from Rockaway Park via the Queens Boulevard express track/63rd Street tunnel and Broadway express tracks to Whitehall Street. (3) A new - V/Q service (14 trains) would operate from 179th Street via the Queens Boulevard local tracks, 63rd Street tunnel and Sixth Avenue local tracks. (4) Other services would be similar to Option 1.

Under this option, 21 trains per hour would use the 63rd Street tunnel. Overall, some 105 inbound trains would enter Manhattan on the four river crossings.

3. Ridership. Table 4-12 gives anticipated peak hour ridership by route and river crossing. The extension to the Rockaways would result in 3000 additional peak hour trips across the East River. Of these, about 1800 would be diverted from the existing Rockaway service, and 700 from the Long Island Railroad; some 800 "new" trips are anticipated.<sup>2</sup>

The 63rd Street tunnel would carry about 23,000 passengers and 15,000 on V/Q trains and 8000 on "W" trains. Ridership on the E and F trains would approximate 21,000 and 20,000 respectively.

4. Costs. Costs are estimated at \$500 million: - \$150 million for the fifth track, \$200 million for the local-express connection to the Rockaway Branch, and \$150 million for the Rockaway extension. (These costs are in addition to those for Option 1-1.)

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<sup>2</sup> Sources of peak-hour ridership on the Rockaway-Queens Boulevard trains are: Rockaway Park, 1000; Far Rockaway, (transfer) 800; Brooklyn Manor, 500; Yellowstone-Metropolitan, 1800; Roosevelt Avenue, 1700; and 21<sup>st</sup> Avenue, 1000. Potential JFK ridership was not included.

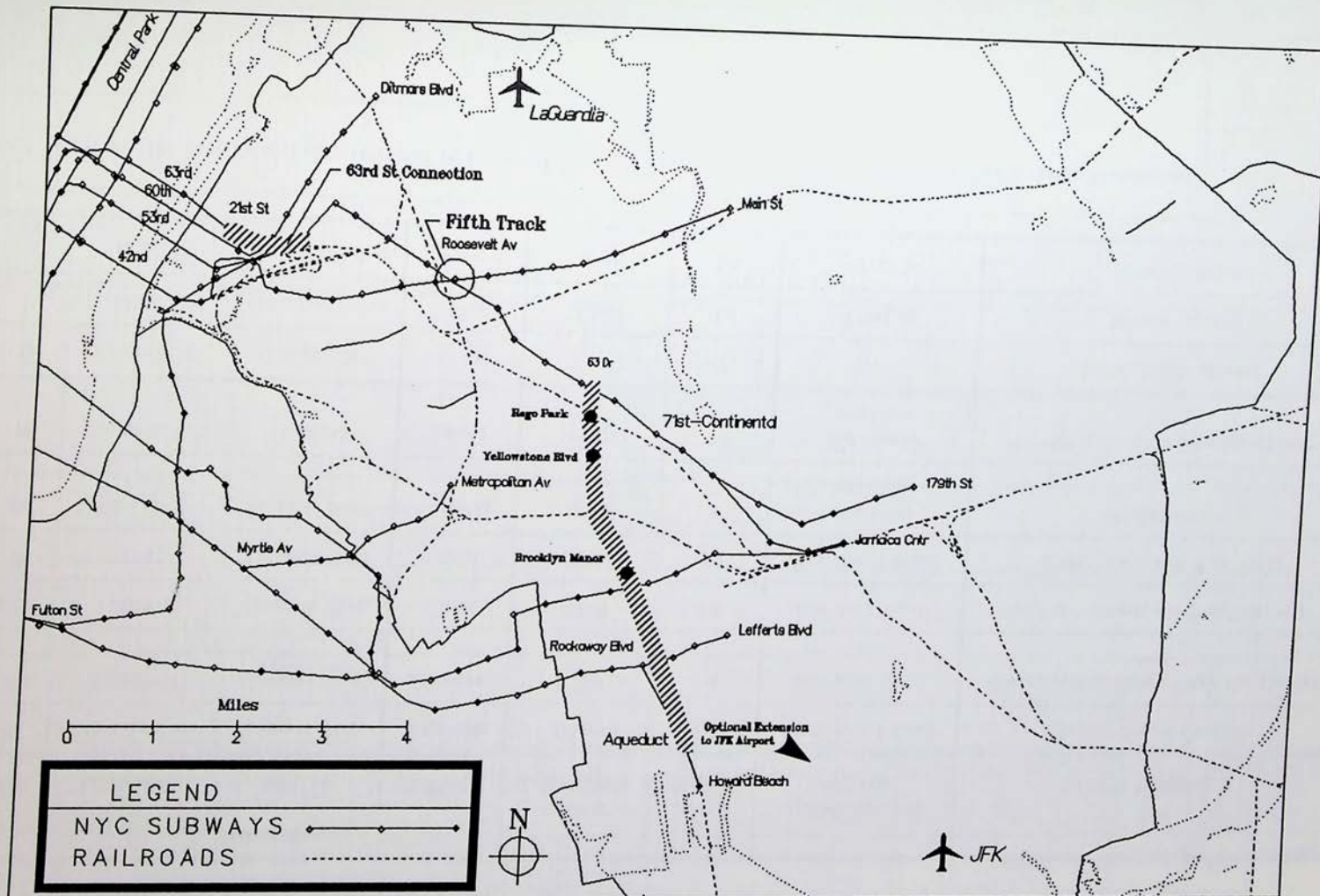


Figure 4-6

**Option 1-6: Reversible 5th Track at Roosevelt with Rockaway Branch Connection**



Table 4-11

**Operating Plan - Option 1-6: Reversible Fifth Track at Roosevelt Ave Extension to Rockaways  
(Inbound AM Peak Hour)**

| LINE             | QUEENS        |               |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE         | OTHER TERMINAL                         |
|------------------|---------------|---------------|---------|-------------------|----------------|----------------------------|----------------------------------------|
|                  | TERMINAL      | ROUTE         | SERVICE |                   |                |                            |                                        |
| E                | Jamaica Cntr  | Queens Blvd   | Express | 53rd              | 14             | 8th Ave local              | World Trade Center                     |
| F                | 179th St      | Queens Blvd   | Express | 53rd              | 14             | 6th Ave local              | Coney Island/Kings Hwy via Culver line |
| V/Q <sup>1</sup> | 179th St      | Queens Blvd   | Local   | 63rd              | 14             | 6th Ave local <sup>1</sup> | Brighton Beach via Brighton exp        |
| R                | 71st          | Queens Blvd   | Local   | 60th              | 14             | Broadway local             | 95th St via 4th Ave local              |
| W                | Rockaway Park | Queens Blvd   | Express | 63rd              | 7              | Broadway express           | Whitehall St                           |
| N                | Ditmars Blvd  | Astoria       | Local   | 60th              | 14             | Broadway express           | Coney Island via Sea Beach exp         |
| G                | Court St      | Queens Bkln   | Local   | --                | 7              | -----                      | Smith / 9th streets                    |
| 7                | Main St       | Roosevelt Ave | Local   | 42nd              | 14             | 42nd St                    | Times Square                           |
| 7                | Main St       | Roosevelt Ave | Express | 42nd              | 14             | 42nd St                    | Times Square                           |

<sup>1</sup> Via B and 6th Ave local if Q is rerouted to Upper Manhattan. Some service may terminate at 2nd Avenue-Manhattan.

Table 4-12

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-6: Reversible 5th Track at Roosevelt Avenue (With Extension to Rockaway)**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 15,000              | 0.77         |
|             |          |                                                    | U           | 7      | 9,800    | 8,000               | 0.82         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 23,000              | 0.78         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 15,000              | 0.77         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 33,000              | 0.84         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 20,000              | 1.02         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 41,000              | 1.05         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 133,000             | 0.94         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT. 3000 new trips across Cordon.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

5. Institutional and Environmental Considerations. A short section of the Rockaway Branch extension passes through a densely developed area. Although once an active railroad, some community concerns are likely over reactivating of the line.

6. Assessment. This option makes better use of the 63rd Street tunnel, 21 trains versus 14 in the planned Northern Boulevard Connection. It eliminates the delays to express trains at Roosevelt Avenue. It provides faster and more direct subway service between the Rockaways, and south central Queens and Midtown Manhattan. It also serves sections of Rego Park that are beyond walking distance of subways.

This concept has several disadvantages: (1) It involves a relatively high capital cost for an increase of 7 trains through 63rd Street, (2) the service to Rockaways generates relatively little new patronage (5300 peak-hour riders of which 3000 come from the Rego Park area); and (3) there could be major delays and service disruptions at Roosevelt Avenue during the construction period.

The concept becomes more meaningful if major urban redevelopment occurs in the Rockaways, if improved connections to JFK Airport are made, or if Aqueduct is redeveloped in conjunction with the airport. However, even then, the number of additional trains would be limited by the signal system along the single express track both east and west of Roosevelt Avenue.

#### Option 1-7. Revised Service Pattern at Roosevelt Ave with Rockaway Branch Connection.

1. Plan Features. This option is conceptually similar to Option 1-6 in that it calls for an express-local connection to a reactivated LIRR Rockaway line. However, instead of building a fifth track through Roosevelt Avenue, all peak-period peak-direction express trains would skip this station thereby eliminating expense of the fifth track.

2. Service Plan. The service plan is essentially the same as that for Option 1-6. However, all peak express trains would skip Roosevelt Avenue thereby allowing the track capacity to be increased from 28 to 35 trains per hour.

3. Ridership. Anticipated ridership is shown in Table 4-13. The overall ridership by river crossing is virtually to that for Option 1-6. However, passengers normally transferring to, or boarding express trains at Roosevelt Avenue would remain on the V/Q and R locals. This has the effect of increasing V/Q and R ridership (to about 90% of capacity) and reducing Rockaway U ridership to about 50% of capacity. E and F ridership would total 40,000, slightly over capacity.

4. Costs. Costs are estimated at \$350 million in addition to those for Option 1-1.

5. Institutional/Environmental Considerations. Reactivation of the abandoned Rockaway Branch could result in community concerns where the line passes through a heavily developed area.



Table 4-13

Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-7: 63rd Street Connection; Revised Service Patterns; Extension to Rockaways

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 17,000              | 0.87         |
|             |          |                                                    | U           | 7      | 9,800    | 5,000               | 0.51         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 22,000              | 0.75         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 17,000              | 0.87         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 35,000              | 0.89         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 20,000              | 1.02         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 20,000              | 1.02         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 40,000              | 1.02         |
| 42nd        | 7        | 38,000                                             | 7           | 21     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 21     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 141,680  | 133,000             | 0.94         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

6. Assessment. The strengths and weaknesses of this concept are generally similar to Option 1-6. Specific advantages include a lower capital cost and less disruption of service during construction. The option also does not wholly depend upon the Rockaway extension, since it may be possible to operate a few more E and F trains.

This option has several disadvantages. (1) It provides virtually no relief to the R service via 60th Street over the no-build option, (2) it substantially reduces use of the existing Rockaway line, and (3) it converts the heavily traveled Roosevelt Avenue station to a local station, precluding the Number 7 transfer to Queens Boulevard express trains.

## **2 - QUEENS BYPASS AND RELATED OPTIONS.**

This group of options involves building the Queens Boulevard Bypass, variations and additions to it, and/or new service to LaGuardia Airport.

The Queens Bypass option, and various modifications of it are generally operationally superior to the 63rd Street-Queens Boulevard connection. The bypass concepts recognize that the bulk of the demand and the need for more service and capacity is mainly in Eastern Queens. They also provide a framework for further extensions of the system. They generally allow 21 trains per hour through the 63rd Street tunnel, and in some cases more. They generally retain the Queens -Brooklyn crosstown (G) service on Queens Boulevard.

The option costs more than the 63rd Street-Queens Boulevard connection. Use of the Long Island Rail Road right-of-way results in relatively low construction cost, especially between Woodside and Rego Park where abandoned track beds exist. However, the costs are substantial and the construction is sometimes difficult when the alignments enter and leave the LIRR right-of-way.

The bypass-related options generally obviate the need for 63rd Street - Queens Boulevard connection. However, for planning purposes, this connection has been assumed in most options.

### **Options 2-1, 2-2, 2-3. Queens Bypass.**

1. Plan Features. The Queens bypass options as envisioned herein connect the 63rd Street tunnel with the Queens Boulevard line local - tracks just east of 71st/Continental Avenue in Forest Hills. There could be one intermediate station at Woodside.

Figure 4-7 shows the Queens Bypass concept. The "bellmouth" east of 29th Street would be extended on the north, south, or both sides of the LIRR to Forest Hills where it would join the Queens Boulevard line local tracks.



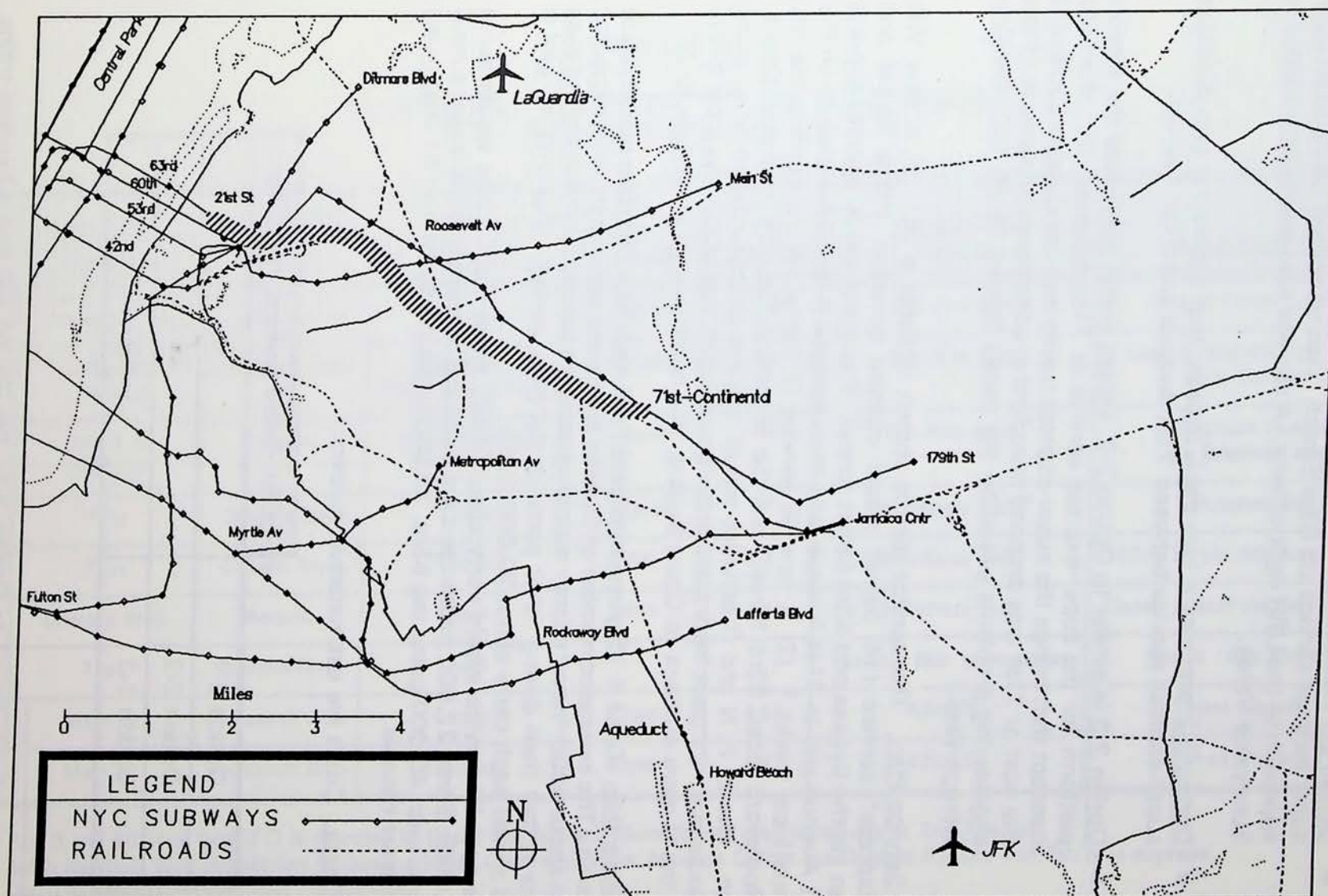


Figure 4-7

Options 2-1, 2-2, 2-3: Queens Bypass



- Option 2-1 proposes a single track bypass for peak-period peak-direction super express service via 63rd Street. Two tracks are provided on each approach to the LIRR right-of-way. A storage yard would be provided in Sunnyside Yards.
- Option 2-2 provides a two-track bypass, that allows for two-direction super-express service between 71st Avenue and 21st Avenue.
- Option 2-3 is similar to Option 2-2, except that it eliminates the station platform for the super-express service at 71st Avenue. (An alternate concept that brings the super-express tracks into the Queens Boulevard line east of 71st was dropped from further consideration because of the engineering problems posed by the tracks leading to the IND Jamaica storage yard.)

2. Service Plan. The service plan is shown in Table 4-14. (1) A new V/Q "Super Express" service (14 trains) would operate between 179th Street and Manhattan via the Bypass and 63rd Street tunnel. The trains would operate express from 71st Avenue and to 21st Avenue, and then proceed through Manhattan on the 6th Avenue local tracks.<sup>3</sup> (2) A new W service (7 trains) would operate via the Queens Boulevard local, 63rd Street, and the Broadway local to Whitehall Street, Manhattan. The E, F, N and G services would operate as they presently do along Queens Boulevard. 21 peak-hour Manhattan-bound trains would use the 63rd Street tunnel (if the G were cutback to Court Square, this number would increase to 28).

3. Ridership. Table 4-15 gives anticipated AM rush hour ridership by route and river crossing. The increased number of Queens Boulevard express trains is expected to result in about 4000 "new" riders - mainly passengers who would travel in the peak 30-minutes rather than during other parts of the peak period. The V/Q, E, and F expresses would each carry about 20,000 riders.

The new W service would carry about 7000, while the R trains would serve about 13,000. Some 27,000 passengers are expected to use the 63rd Street tunnel as compared with 40,000 using the 53rd, 36,000 using the 42nd, and 31,000 using the 60th Street tunnels.

4. Costs. Costs are estimated as follows:

|            | COST (1990 Dollars, in millions) |
|------------|----------------------------------|
| Option 2-1 | 850                              |
| Option 2-2 | 900                              |
| Option 2-3 | 850                              |

<sup>3</sup> The service plan is keyed to Option 2-2. For Option 2-3 super express trains would run non-stop from 75th Avenue or Union Turnpike to 21st Avenue.

Table 4-14

**Operating Plan - Options 2-1, 2-2, 2-3: Queens Bypass  
(Inbound AM Peak Hour)**

| LINE             | QUEENS              |               |                             | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE          | OTHER TERMINAL                       |
|------------------|---------------------|---------------|-----------------------------|-------------------|----------------|-----------------------------|--------------------------------------|
|                  | TERMINAL            | ROUTE         | SERVICE                     |                   |                |                             |                                      |
| E                | Jamaica Cntr        | Queens Blvd   | Express                     | 53rd              | 14             | 8th Ave local               | World Trade Center                   |
| F                | 179th St<br>Jamaica | Queens Blvd   | Express<br>179-Queens Plaza | 53rd              | 14             | 6th Ave local               | Coney Island/Kings Hwy<br>via Culver |
| V/Q <sup>1</sup> | 179th St<br>Jamaica | Bypass        | Super Express<br>71 - 21st  | 63rd              | 14             | 6th Ave local <sup>1</sup>  | Brighton Beach<br>via Brighton exp   |
| W                | 71st                | Queens Blvd   | Local                       | 63rd              | 7 <sup>3</sup> | Broadway local <sup>2</sup> | Whitehall St <sup>2</sup>            |
| R                | 71st                | Queens Blvd   | Local                       | 60th              | 14             | Broadway local              | 95th St via 4th Ave local            |
| N                | Ditmars Blvd        | Astoria       | Local                       | 60th              | 14             | Broadway exp                | Coney Island via Sea Beach           |
| G                | 71st                | Queens Blvd   | Local                       | --                | 7              | Queens Bkln crosstown       | Smith - 9th streets                  |
| 7                | Main St             | Roosevelt Ave | Local                       | 42nd              | 14             | 42nd St                     | Times Square                         |
| 7                | Main St             | Roosevelt Ave | Express                     | 42nd              | 14             | 42nd St                     | Times Square                         |

<sup>1</sup> Via B and 6th Ave local if Q is rerouted to Upper Manhattan. Some trains may terminate at 2nd Avenue.

<sup>2</sup> With Northern Blvd connection to Queens Blvd. Otherwise from Jamaica Center via Queens Bypass and 7th Ave express.

<sup>3</sup> Assumes Northern Boulevard connection.

Table 4-15

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Options 2-1, 2-2, 2-3: Queens Bypass**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 20,000              | 1.02         |
|             |          |                                                    | W           | 7      | 9,800    | 7,000               | 0.71         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 27,000              | 0.92         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 13,000              | 0.66         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 31,000              | 0.79         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 20,000              | 1.02         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 20,000              | 1.02         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 40,000              | 1.02         |
| 42nd        | 7        | 38,000                                             | 7           | 21     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 21     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 134,000             | 0.95         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.



5. Assessment. The Queens Bypass Option has several important advantages. (1) It makes it possible to operate 21 trains through the 63rd Street tunnel in the peak-hour, with the potential for 28 trains. Thus, it provides long range capacity relief. (2) It reduces overcrowding on the Queens Boulevard E/F expresses by generating equal use of the three express services. (3) It provides faster service to Eastern Queens since the super-express trains would make one less stop than the existing E/F expresses west of 71st Avenue.

The principal disadvantage is the relatively high cost which is double that for the Queens Boulevard connection. In addition, the Bypass serves no new markets.

The single track bypass produces minimum cost savings over the two-track bypass. At the same time, it increases operational complexity, reduces operating flexibility, and has no provisions for service breakdown. Therefore, it is the least desirable of the bypass options. It was rejected by the NYCTA about 1968.

#### Option 2-4. Queens Bypass Connection to Rockaway Line and JFK.

1. Plan Features. This option connects the 63rd Street tunnel to the Rockaway line via a double track bypass along both sides (or the south side) of the Long Island Railroad, and a re-activated LIRR Rockaway Branch. Super-express service would operate both ways during peak and base periods. A spur from the Aqueduct or Howard Beach area would connect with JFK. The concept, shown in Figure 4-8, includes new stations at Woodsick Rego Park, Yellowstone/Metropolitan and Brooklyn Manor - Jamaica Avenue.

2. Service Plan. The service plan is shown in Table 4-16. A new V/Q express operates from Rockaway Park and JFK (14 trains) via the Bypass and the 63rd Street tunnel to Manhattan; trains run via the 6th Avenue local tracks in Manhattan. A new "W" Queens Boulevard local service (7 trains) operates from 179th Street via the 63rd Street tunnel and Broadway local to Whitehall Street. There is no change in other services. Thus, 21 trains operate through the 63rd Street tunnel.

3. Ridership. Table 4-17 gives anticipated AM rush hour ridership by route and river crossing. The extensions to JFK and Rockaways are expected to add 5000 inbound peak hour riders, of which about 2800 are new riders.

The 63rd Street tunnel would serve 19,000 passengers, 9000 in 14 V/Q trains from the Rockaways, and 10,000 in 7 W trains from 179th Street. Because the market is concentrated along Hillside Avenue and Queens Boulevard, rather than the Rockaway Branch, the 7 W trains would have a volume-to-capacity ratio of over 1, while the Rockaway/JFK trains would have a v/c ratio of 0.56. More significantly, the E, F trains would remain heavily used, carrying 46,000 riders.

4. Costs. Estimated costs in 1990 dollars are \$900 million: \$425 million for the bypass, \$175 million for the Rockaway connection, and \$300 million for the JFK extension depending upon the JFK terminal and distribution system. These values represent incremental costs above those for the Queens Boulevard connection.

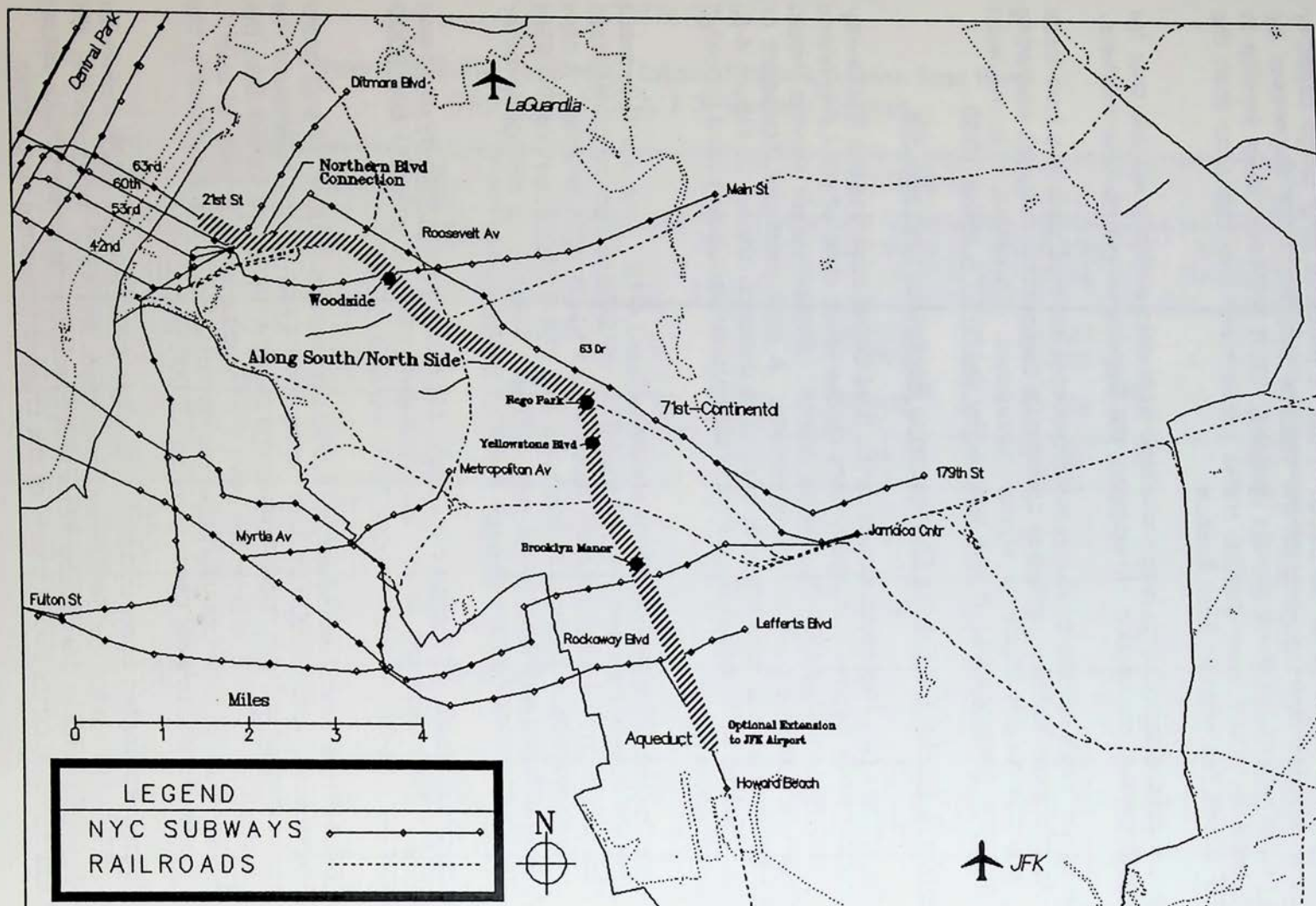


Figure 4-8

Option 2-4: Queens Bypass - Rockaway - JFK Connection

Table 4-16

**Operating Plan - Option 2-4: Queens Bypass Connection to Rockaway Line and JFK  
(Inbound AM Peak Hour)**

| LINE             | QUEENS        |               |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE    | OTHER TERMINAL                                    |
|------------------|---------------|---------------|---------|-------------------|----------------|-----------------------|---------------------------------------------------|
|                  | TERMINAL      | ROUTE         | SERVICE |                   |                |                       |                                                   |
| E                | Jamaica Cntr  | Queens Blvd   | Express | 53rd              | 14             | 8th Ave local         | World Trade Center                                |
| F                | 179th St      | Queens Blvd   | Express | 53rd              | 14             | 6th Ave local         | Coney Island via Culver                           |
| V/Q <sup>1</sup> | Rockaway Park | Bypass        | Express | 63rd              | 7              | 6th Ave local         | Brighton Beach via<br>Brighton exp <sup>1,2</sup> |
| V/Q <sup>1</sup> | JFK           | Bypass        | Express | 63rd              | 7              | 6th Ave local         |                                                   |
| R                | 71st          | Queens Blvd   | Local   | 60th              | 14             | Broadway local        | 95th St via 4th Ave local                         |
| N                | Ditmars Blvd  | Astoria       | Local   | 60th              | 14             | Broadway express      | Coney Island via<br>Sea Beach                     |
| W                | 179th St      | Queens Blvd   | Local   | 63rd              | 7              | Broadway local        | Whitehall St                                      |
| G                | 71st          | Queens Blvd   | Local   | --                | 7              | Queens Bkln crosstown | 9th - Smith                                       |
| 7                | Main St       | Roosevelt Ave | Express | 42nd              | 14             | 42nd St               | Times Square                                      |
| 7                | Main St       | Roosevelt Ave | Local   | 42nd              | 14             | 42nd St               | Times Square                                      |

<sup>1</sup> B via 6th Ave local if Q is rerouted to Upper Manhattan.

<sup>2</sup> Some trains might skip at 2nd Ave in Manhattan.



Table 4-17

Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 2-4: Bypass Extension to Rockaways

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 9,000*              | 0.56         |
|             |          |                                                    | W           | 7      | 9,800    | 10,000              | 1.02         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 19,000              | 0.64         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.89         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 23,000              | 1.17         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 23,000              | 1.17         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 46,000              | 1.17         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 112    | 141,680  | 135,000             | 0.95         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

\* Includes 2000 JFK trips but excludes ridership from proposed redevelopment in Rockaways.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

5. Assessment. The option provides direct midtown subway service to Rego Park, JFK, and the Rockaways, with dramatic reductions in travel times. It results in 21 trains running through the 63rd Street tunnel. There are, however, several significant disadvantages. (1) Ridership on the Rockaway and JFK lines are light, resulting in a low ridership for the costs involved. (2) There is minimal relief to the Queens Boulevard corridor, since only 7 more trains are operated than at present. (3) Finally, the JFK service misses the potential Jamaica transfer market from the Long Island Railroad.

To make this option more viable, it would be necessary to turn the "G" trains back at Court Square, operate 12 to 14 W trains from 179th Street via the 63rd Street tunnel, and reduce the number of V/Q trains from 14 to 12 or less. From a cost perspective, it might be desirable to eliminate the JFK service, or build a separate shuttle connection (e.g. a people mover).

#### Option 2-5. Queens Bypass with Southeast Queens Extension.

1. Plan Features. The original concept for this option was to extend the Bypass through Kew Gardens to join the Queens Boulevard-Jamaica Center line south of Hillside Avenue, and the Archer Avenue subway was extended via the Atlantic Branch of the Long Island Rail Road to Laurelton. However, this concept proved virtually impossible to build and it would involve disruption to the recently completed Archer Avenue subway.

Accordingly, an alternate southeast Queens extension was formulated in which the bypass followed each side of the LIRR through Forest Hills and Kew Gardens, and then joined the Queens Boulevard line at about 83rd Avenue just north of the Maple Grove Cemetery. This second concept involved difficult construction, and considerable flexing relatively near to the Hillside-Jamaica Center junction and the cemetery. It produced no operating advantages over the 71st Avenue connection (to the local tracks).

This led to the revised concept shown in Figure 4-9. This concept (1) develops the Queens Bypass from Long Island City to 71st Street Forest Hills where it connects with the local tracks (2) extends the Archer Avenue (Queens Boulevard) line via the LIRR Atlantic Branch to Laurelton and (3) reroutes the LIRR trains via the St. Albans line. If the LIRR needs the Atlantic Branch's track capacity, then the extension would need tracks to parallel to the existing LIRR tracks.

2. Service Plan. The operating concept is shown in Table 4-18. (1) The V/Q service (14 trains) operates via the Queens Bypass, 63rd Street tunnel and 6th Avenue local, making all stops from 179th to 71st Street. The F service (14 trains) continues to operate express from 179th to Queens Plaza, and enter Manhattan via the 53rd Street tunnel. (2) The E service (14 trains) operates from Laurelton over the Queens Boulevard express tracks, entering Manhattan via the 53rd Street tunnel; it runs express west of Jamaica-Van Wyck. A new W service (7 trains) operates from 108th Street via the Queens Boulevard local tracks to 71st and then operates via the Bypass, 63rd Street and Broadway express to Whitehall Street in Manhattan.<sup>4</sup>

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<sup>4</sup> Alternately, the W service (7 trains) could operate via the Queens Boulevard local and the Queens Boulevard connection into Manhattan.



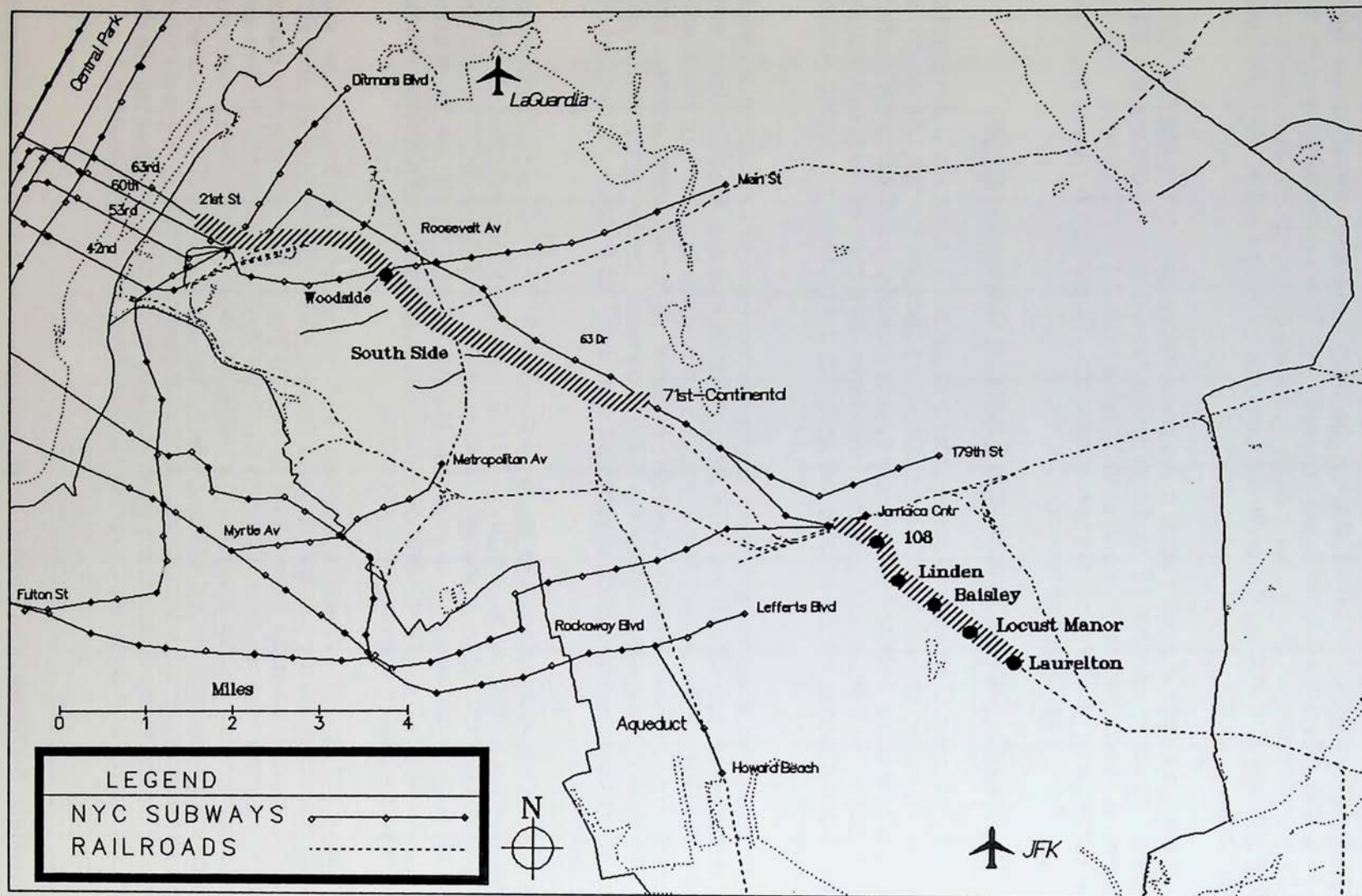


Figure 4-9

Option 2-5: Queens Bypass With Southeast Queens Extension



Table 4-18

**Operating Plan - Option 2-5: Queens Bypass and Southeast Queens Extension  
(Inbound AM Peak Hour)**

| LINE             | QUEENS            |               |                                           | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE        | OTHER TERMINAL                              |
|------------------|-------------------|---------------|-------------------------------------------|-------------------|----------------|---------------------------|---------------------------------------------|
|                  | TERMINAL          | ROUTE         | SERVICE                                   |                   |                |                           |                                             |
| E                | Laurelton         | Queens Blvd   | Express<br>Jamaica Cntr -<br>Queens Plaza | 53rd              | 14             | 8th Ave local             | World Trade Center                          |
| F                | 179th St Jamaica  | Queens Blvd   | Express<br>179th - Queens Plaza           | 53rd              | 14             | 6th Ave local             | Coney Island or Kings<br>Highway via Culver |
| V/Q <sup>1</sup> | 179th St Jamaica  | Bypass        | Express<br>71st 21st Ave                  | 63rd              | 14             | 6th Ave local             | Brighton Beach via<br>Brighton Express      |
| W                | 108th             | Bypass        | Express<br>71st 21st Ave                  | 63rd              | 7              | Broadway express          | Whitehall St                                |
| R                | 71st              | Queens Blvd   | Local                                     | 60th              | 14             | Broadway local            | 95th St via 4th Ave local                   |
| N                | Ditmars Blvd      | Astoria       | Local                                     | 60th              | 14             | Broadway express          | Coney Island via<br>Sea Beach express       |
| 7                | Main St, Flushing | Roosevelt Ave | Local                                     | 42nd              | 14             | 42nd St                   | Times Square                                |
| 7                | Main St, Flushing | Roosevelt Ave | Express                                   | 42nd              | 14             | 42nd St                   | Times Square                                |
| G                | 71st              | Queens Blvd   | Local                                     | ---               | 7              | Queens-Bklyn<br>crosstown | Smith / 9th streets                         |

<sup>1</sup> B via 6th Ave local if Q is rerouted to Upper Manhattan. Some trains may stop at 2nd Avenue.

The R service (14 trains) via 60th Street and the Queens-Brooklyn crosstown route (7 trains) operate via the Queens Boulevard local tracks from 71st. The N and 7 services remain unchanged. Thus, 21 trains use 63rd Street to enter Manhattan in the AM peak hour.

3. Ridership. Table 4-19 gives anticipated AM peak hour ridership by route and river crossing. The combination of super-express service via the Bypass and expanded operations over the Atlantic Branch should result in about 10,000 more peak hour subway passengers crossing the East River. Of these, about 6000 would be new riders or passengers diverted from the LIRR or express buses, while 4000 would represent passengers who previously traveled via subway at other times.

About 28,000 passengers would use the 63rd Street tunnel, 20,000 in V/Q trains and 8000 in W trains. About 34,000 passengers would use the 60th Street tunnel. E trains would carry about 27,000 riders and F trains 20,000 riders into Manhattan via 53rd Street. About 36,000 riders would use the Steinway (42nd Street) tunnels.

4. Costs. Estimated costs are \$900 million for the Bypass and \$200 million for the southeast Queens extension. These costs are in addition to those for the Queens Boulevard connection.

5. Institutional and Environmental Considerations. The Southeast Queens extension requires the cooperation and concurrence of the Long Island Railroad.

6. Assessment. This option provides the various operating and capacity benefits associated with the Queens Bypass (Option 1-2). In addition, it gives direct subway service to both Manhattan and Jamaica from the heavily populated South Jamaica area. It will also reduce NYCTA bus volumes on Archer Avenue, Jamaica Avenue and Merrick Boulevard in Jamaica Center.

The concept has the drawback of high development costs. It also involves readjustments of LIRR service to Laurelton, Valley Stream and Far Rockaway. Capacity of the Montauk Branch might be taxed.

#### Option 2-6. Queens Bypass Connection to East Central Queens Line.

1. Plan Features. This option extends the 63rd Street line, to east Central Queens by means of a modified Queens Bypass along the north side of the Long Island Railroad tracks. Figure 4-10 shows the general alignment. A more detailed description follows:

Table 4-19

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 2-5: Queens Bypass With Southeast Queens Extension**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 20,000              | 1.02         |
|             |          |                                                    | W           | 7      | 9,800    | 8,000               | 0.82         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 28,000              | 0.96         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 22,000              | 1.12         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 20,000              | 1.02         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.12         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 135,000             | 0.99         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.



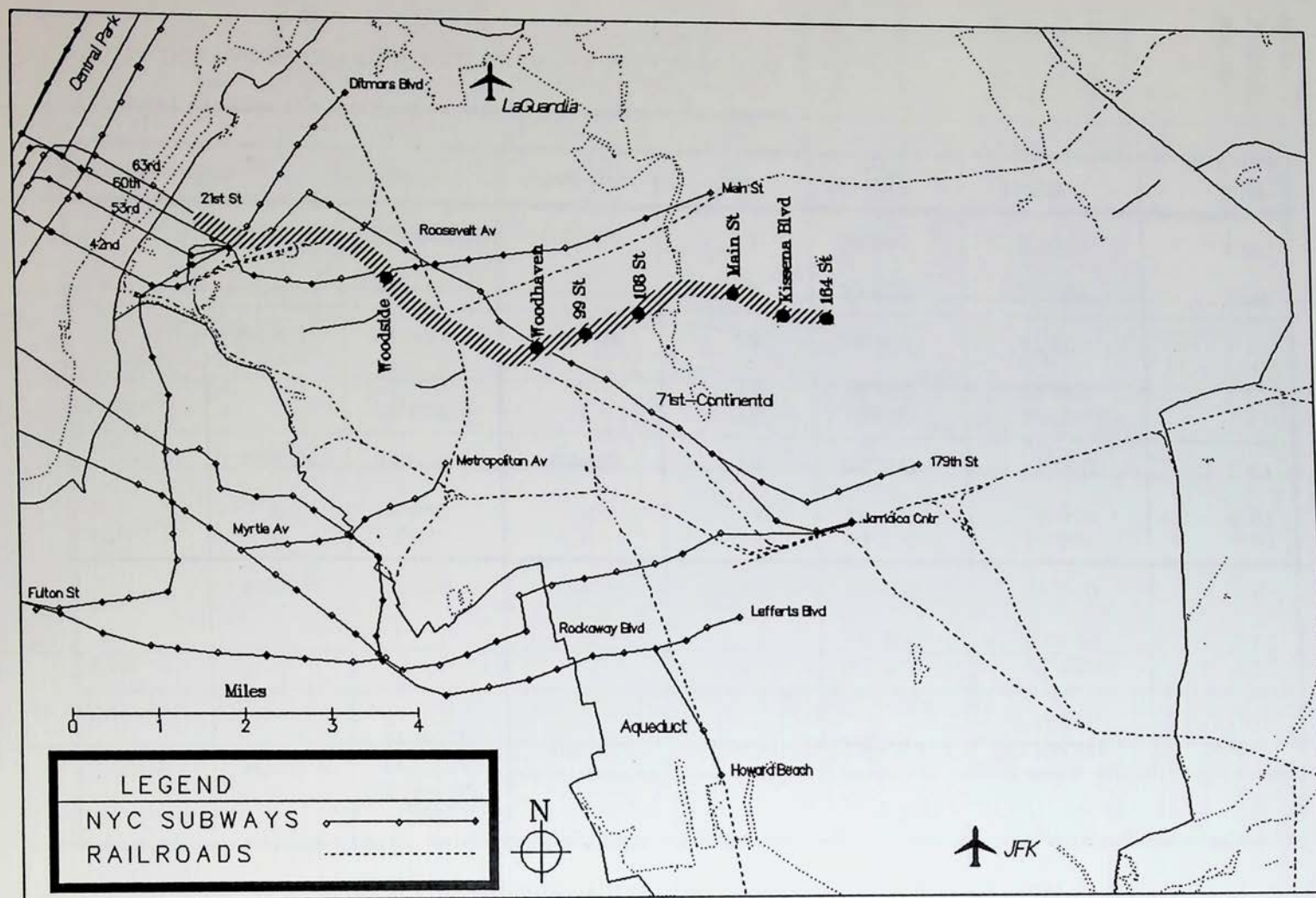


Figure 4-10

Option 2-6: Queens Bypass With LIE East Queens Line

The upper/end "bellmouth tracks" branch from the Queens Boulevard extension would extend along the north side of Sunnyside Yards and the Long Island Rail Road going under the Hell Gate tracks and over the Port Washington tracks. The line then follows the north side of the Long Island Expressway (in subway), crosses over to the south side at the Van Wyck Expressway and proceeds (in subway) to about 164th Street.<sup>5</sup> This alignment passes close to Lefrak City, Queens College, and the Pomonok and Electchester houses. Stations are provided at Woodhaven Boulevard (transfer with Queens Boulevard, Lefrak City, 108th Street, Main Street, Kissena Boulevard, and 164th Street. A bus terminal would be built over the LIE at 164th Street with direct transfer to the subway.

2. Service Plan. The service plan is shown in Table 4-20. The V/Q service (14 trains) operates from 164th Street via the modified bypass, 63rd Street, and the Sixth Avenue local tracks. The W service (7 trains) operates from 179th Street via the Queens Boulevard local tracks, 63rd Street and the Broadway local (or express) to Whitehall Street.

The R service (14 trains) operates from 71st, along with the N service from Astoria (14 trains) via the 60th Street tunnel (if demands warrant, a portion of the R service could start at 179th Street). The E, F and 7 services are unchanged. Thus, 21 trains would operate via 63rd Street to Manhattan.

3. Ridership. Table 4-21 gives anticipated A.M. peak hour ridership by route and river crossing. The LIE extension is expected to attract about 7000 new riders during the morning peak hour - mainly from cars and express buses. It will also attract subway passengers from the Lefrak City environs who now use Woodhaven Boulevard, and riders from eastern Queens using Queens Boulevard and Flushing express trains. Aggregate line ridership west of Woodhaven Boulevard is estimated at 15,000 AM inbound passengers.<sup>6</sup>

The 63rd Street tunnel is estimated to carry 27,000 riders - 18,000 on V/Q trains and 9000 on W trains. The 53rd Street E and F trains would carry 42,000 riders, the 60th Street N and R trains 33,000, and the Flushing line 7 trains 34,000. Thus, the LIE subway extension relieves both the Flushing and Queens Boulevard lines.

4. Costs. Costs are estimated at \$400 million for the bypass and \$1.1 billion for the LIE extension. The total costs of \$1.5 billion would be in addition to those for the Queens Boulevard connection. A further extension to Fresh Meadows might add 200 million dollars.

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<sup>5</sup> Alternatively, it could extend to the Fresh Meadows apartment complex.

<sup>6</sup> Estimated AM peak hour riders by station are 164th, 2000; Kissena Boulevard, 2000; Main Street, 2000; 108th, 2000; Lefrak, 3000; and Woodhaven, 2000.

Table 4-20

Operating Plan - Option 2-6: Queens Bypass With L.I.E. Line  
(Inbound - AM Peak Hour)

| LINE             | QUEENS        |               |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE | OTHER TERMINAL                     |
|------------------|---------------|---------------|---------|-------------------|----------------|--------------------|------------------------------------|
|                  | TERMINAL      | ROUTE         | SERVICE |                   |                |                    |                                    |
| E                | Jamaica Cntr  | Queens Blvd   | Express | 53rd              | 14             | 8th Ave local      | World Trade Center                 |
| F                | 179th St      | Queens Blvd   | Express | 53rd              | 14             | 6th Ave local      | Coney Island/Kings Hwy via Culver  |
| V/Q <sup>1</sup> | LIE - Parsons | Bypass        | Express | 63rd              | 14             | 6th Ave local      | Brighton Beach via Brighton line   |
| W                | 179th St      | Queens Blvd   | Local   | 63rd              | 7              | Broadway express   | Whitehall St                       |
| R                | 71st          | Queens Blvd   | Local   | 60th              | 14             | Broadway express   | 95th via 4th Ave local             |
| N                | Ditmars Blvd  | Astoria       | Local   | 60th              | 14             | Broadway express   | Coney Island via Sea Beach express |
| G                | 71st          | Queens Blvd   | Local   | --                | 7              | Queens-Bklyn local | 9th - Smith                        |
| 7                | Main St       | Roosevelt Ave | Local   | 42nd              | 14             | 42nd St            | Times Square                       |
| 7                | Main St       | Roosevelt Ave | Express | 42nd              | 14             | 42nd St            | Times Square                       |

<sup>1</sup> B via 6th Ave local if Q is rerouted to Upper Manhattan. Some trains may stop at 2nd Avenue.



Table 4-21

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 2-6: Queens Bypass With L.I.E. Line**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 18,000              | 0.92         |
|             |          |                                                    | W           | 7      | 9,800    | 9,000               | 0.92         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 27,000              | 0.92         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 15,000              | 0.77         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 33,000              | 0.84         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.07         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 34,000              | 1.0          |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 34,000              | 1.0          |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 137,000             | 0.97         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

5. Institutional and Environmental Concerns. The subway construction along the LIE would require sensitive design and construction to avoid impacting Fresh Meadow Park or nearby neighborhoods. Construction along the expressway would be more difficult because of the recent widening.

6. Assessment. This option has several attractive features. (1) It taps a market that is currently unserved (or inconveniently served) by subway. This market generates a relatively large number of motor vehicle trips. (2) It achieves good use of the 63rd Street tunnel (27,000 inbound peak hour passengers). (3) It relieves both the Flushing and Queens Boulevard lines. (4) It also relieves the existing Woodhaven Boulevard station (one of the busiest local stations in New York City).

The option, unlike the initial Bypass concept, complements rather than competes with the planned Queens Boulevard connection.

The major weakness of the plan is its high initial investment cost. Construction would be difficult through Flushing Meadows Park because of poor soil conditions.

#### Option 2-7. Bypass Truncated East of Grand Avenue.

1. Plan Features. This option represents an alternative to the planned 63rd Street connection to the Queens Boulevard line at Northern Boulevard. The objective is to provide an alternate treatment that speeds up local service via the 63rd Street tunnel and thereby increases ridership.

The option, shown in Figure 4-11, develops a two-track bypass along the north side of the Sunnyside Yards area that connects with the local tracks east of Grand Avenue. It would thereby make express service available for riders using the 67th Avenue, 63rd Drive and Woodhaven stations. In addition to this basic option, referred to as "a" on Figure 4-11, there are two variations. Option "a + b" provides a turnback for G trains east of Roosevelt Avenue thereby enabling the crosstown service to continue along the western part of the Queens Boulevard line.

Option "a + b + c" uses the existing bellmouth at 63rd Drive to connect with a line to the Rockaways via the abandoned Rockaway branch and the existing Rockaway service.

2. Service Plan. the service plan for the three variations of this concept are shown in Table 4-22.

- The plan for the basic Option "a" is similar to that for the Northern Boulevard connection. (a) 14 V/Q trains from 179th Street are routed via the Queens Boulevard local tracks, the truncated bypass and the 63rd Street tunnel to 6th Avenue in Manhattan. (b) The R service (14 trains) operate from 71st Avenue via the Queens local tracks and Broadway in Manhattan. (c) The G service (6 trains) operate from Court Square. (d) There is no change in E, F, N, and 7 operations.



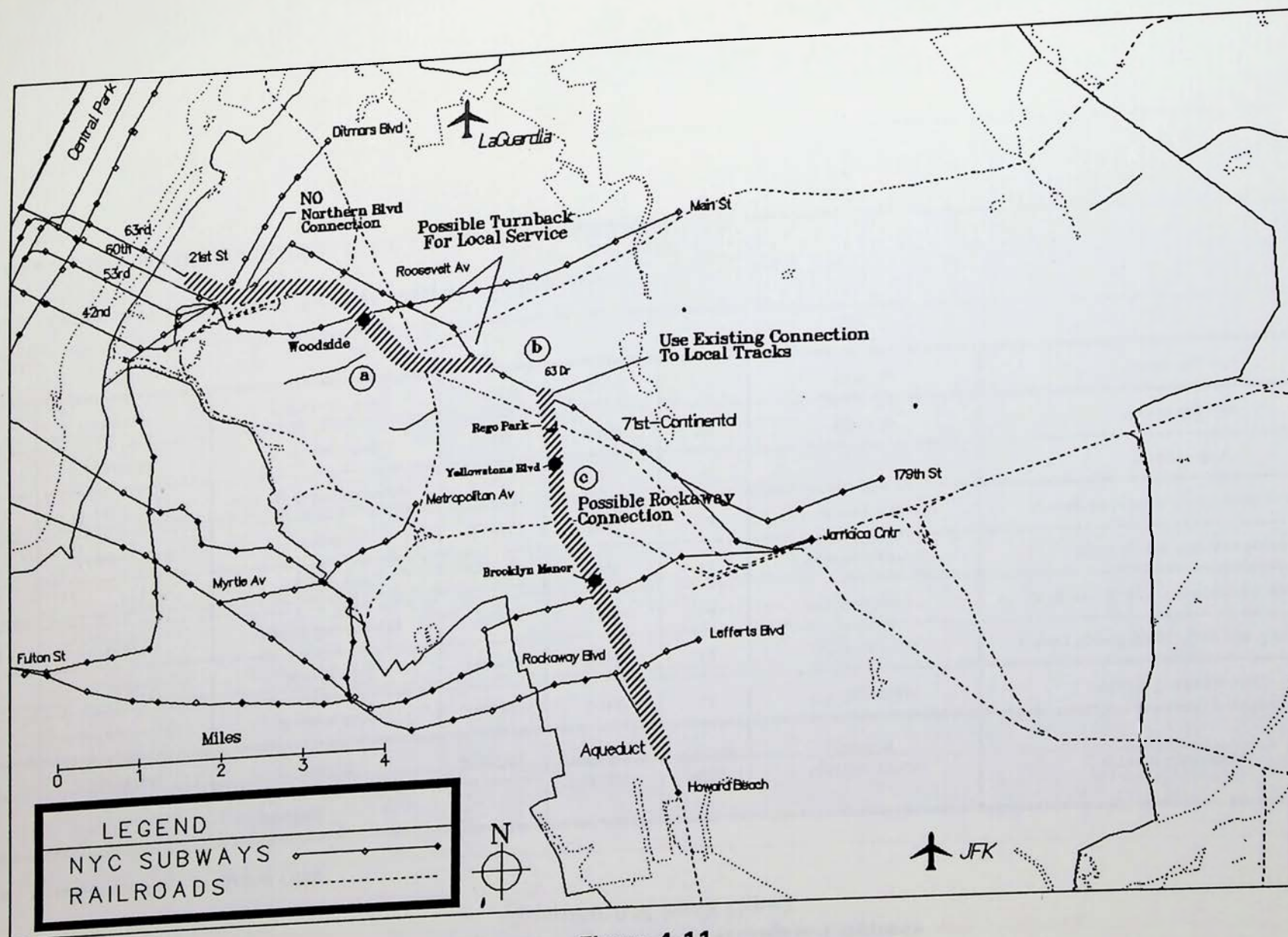


Figure 4-11

Option 2-7: Truncated Bypass



Table 4-22

Operating Plan - Option 2-7: Truncated Bypass  
(Inbound AM Peak Hour)

a - Connection East of Grand Only.

| LINE             | QUEENS       |                        |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE         | OTHER TERMINAL                         |
|------------------|--------------|------------------------|---------|-------------------|----------------|----------------------------|----------------------------------------|
|                  | TERMINAL     | ROUTE                  | SERVICE |                   |                |                            |                                        |
| E                | Jamaica Cntr | Queens Blvd            | Express | 53rd              | 14             | 8th Ave local              | World Trade Center                     |
| F                | 179th St     | Queens Blvd            | Express | 53rd              | 14             | 6th Ave local              | Coney Island/Kings Hwy via Culver line |
| V/Q <sup>1</sup> | 179th St     | Queens Blvd/bypass     | Local   | 63rd              | 14             | 6th Ave local <sup>1</sup> | Brighton Beach via Brighton express    |
| R                | 71st         | Queens Blvd            | Local   | 60th              | 14             | Broadway local             | 95th St via 4th Ave local              |
| N                | Ditmars Blvd | Astoria                | Local   | 60th              | 14             | Broadway express           | Coney Island via Sea Beach express     |
| G                | Court Square | Queens Bklyn crosstown | Local   | --                | 7              | --                         | Smith - 9th                            |
| 7                | Main St      | Roosevelt Ave          | Local   | 42nd              | 14             | 42nd St                    | Times Square                           |
| 7                | Main St      | Roosevelt Ave          | Express | 42nd              | 14             | 42nd St                    | Times Square                           |

a, b - Connection plus turnback for local trains east of Roosevelt.

G service extended to Grand Street via Queens Boulevard local.

Table 4-22 (Continued)

a, b, c - Connection, turnback, Rockaway extension.

| LINE             | QUEENS       |                    |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE           | OTHER TERMINAL                         |
|------------------|--------------|--------------------|---------|-------------------|----------------|------------------------------|----------------------------------------|
|                  | TERMINAL     | ROUTE              | SERVICE |                   |                |                              |                                        |
| E                | Jamaica Cntr | Queens Blvd        | Express | 53rd              | 14             | 8th Ave local                | World Trade Center                     |
| F                | 179th        | Queens Blvd        | Express | 53rd              | 14             | 6th Ave local                | Coney Island via Culver                |
| V/Q <sup>1</sup> | 179th        | Queens Blvd/Bypass | Local   | 63rd              | 7              | 6th Ave express <sup>1</sup> | Brighton Beach via<br>Brighton express |
| V/Q <sup>1</sup> | Rockaway Fk  | Queens Blvd/Bypass | Local   | 63rd              | 7              | 6th Ave express <sup>1</sup> |                                        |
| R                | 71st         | Queens Blvd        | Local   | 60th              | 14             | Broadway local               | 95th via 4th Ave local                 |
| N                | Ditmars Blvd | Astoria            | Local   | 60th              | 14             | Broadway express             | Coney Island via Sea Beach express     |
| G <sup>2</sup>   | Grand St     | Queens Blvd        | Local   | --                | 7              | --                           | Smith - 9th                            |
| 7                | Main St      | Roosevelt Ave      | Local   | 42nd              | 14             | 42nd St                      | Times Square                           |
| 7                | Main St      | Roosevelt Ave      | Express | 42nd              | 14             | 42nd St                      | Times Square                           |

<sup>1</sup> B via 6th Ave local if Q is rerouted to Upper Manhattan. Some trains may turn back at 2nd Avenue.

<sup>2</sup> G service cut back to Court Square if turnback is not provided.

- Under Option "a+b," the G service continues to Roosevelt Avenue via the Queens Boulevard local tracks.
- Under Option "a+b+c," the 14 V/Q trains alternate from Rockaway Park and 179th Street. Depending upon ridership demands, some of the peak hour R service could begin at 179th Street.<sup>7</sup>
- Under all options, there would be 14 peak-hour trains through the 63rd Street tunnel.

3. Ridership. Tables 4-23 and 4-24 give anticipated ridership information for Option "a" and "a+b+c" respectively.

- Under Option "a," ridership across the East River would total 130,000. Some 19,000 people would utilize the V/Q service through the 63rd Street tunnel, 33,000 riders would use the R and N services via the 60th Street tunnel, 42,000 would use the E and F trains via the 53rd Street tunnel and 36,000 would use the 7 trains via the 42nd Street tunnel.
- Under Option "a+b+c," ridership across the East River would total 133,000. Some 3000 additional riders would cross the river as a result of the extension to the Rockaways. V/Q trains would carry 19,000 riders (against a capacity of 19,600), 60th Street would carry 34,000 riders, 53rd Street, 44,000, and 42nd Street, 36,000.

4. Costs. Costs for this option are as follows:

|                                                              |                       |
|--------------------------------------------------------------|-----------------------|
| a. Bypass extension to Grand Avenue                          | \$ 600 million        |
| b. Turnback at Roosevelt Avenue                              | \$ 100 million        |
| c. Extension to Rockaways (from local tracks)                | \$ <u>200 million</u> |
| <b>Total</b>                                                 | <b>\$ 900 million</b> |
| Increase over 63rd Street connection cost of \$ 450 million. |                       |

5. Assessment. The number of peak hour trains using the 63rd Street tunnel across the East River (14) is the same as that for the planned Queens Boulevard connection. However, this option provides express service for the heavily used local stations west of 71st Avenue, albeit at greater costs. In doing so, it reduces the number of local-express transfers at Roosevelt Avenue and Queens Plaza.

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<sup>7</sup> Note: For a fourth option, Option a+c, the G service would begin at Court Square.



Table 4-23

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 2-7(a): Connection East of Grand Avenue**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 19,000              | 0.97         |
|             | subtotal | 3000                                               | subtotal    | 14     | 19,600   | 19,000              | 0.97         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 15,000              | 0.77         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 33,000              | 0.84         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.07         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 131,880  | 130,000             | 0.99         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

Table 4-24

Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 2-7(a, b): Connection East of Grand Avenue, Extension to Rockaways

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAJNS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q(a)      | 7      | 9,800    | 10,000              | 1.02         |
|             |          |                                                    | V/Q(b)      | 7      | 9,800    | 9,000               | 0.92         |
|             | subtotal | 3000                                               | subtotal    | 14     | 19,600   | 19,000              | 0.97         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.77         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 22,000              | 1.12         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 22,000              | 1.12         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 44,000              | 1.12         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 131,880  | 133,000             | 1.07         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

(a) 179th Street

(b) Rockaways

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

The number of stops in Queens from 71st Avenue by E,F, and V/Q trains would be as follows:

|       | Via E-F Express                                        | Via V/Q Local                                                |
|-------|--------------------------------------------------------|--------------------------------------------------------------|
|       | 71st<br>Roosevelt Avenue<br>Queens Plaza<br>21st - Ely | 71st<br>67th<br>63rd<br>Woodhaven<br>Woodside<br>21st Street |
| Total | 3                                                      | 5                                                            |

The Rockaway extension provides a logical complement to the plan, but will probably require starting some R service at 179th Street in the peak hours. The turnback for G trains at Roosevelt Avenue is costly relative to the benefits achieved.

#### **Option 2-8. LaGuardia Airport Extension via Northern Boulevard.**

1. **Plan Features.** This option extends the 63rd Street subway line along the north side of Sunnyside Yards in subway under Northern Boulevard and 111st street and then elevated along the north side of the Grand Central Parkway corridor to the Shuttle and Main Terminal at LaGuardia Airport. The plan, shown in Figure 4-12, provides stations at 82nd Street, Junction Boulevard, 108th Street, Trump Shuttle Terminal, and Main Terminal. It is designed to accomplish three basic service objectives (a) serve Northern Boulevard apartments in Jackson Heights, (b) provide fast subway access from LaGuardia Field to Midtown and (c) relieve the Flushing line. It would thereby complement the planned Queens Boulevard connection.

2. **Service Plan.** The service plan is shown in Table 4-25. (1) A V/Q Queens Boulevard local (7 trains) operates from 179th Street via the 63rd Street tunnel and the 6th Avenue local tracks; however, if the G service is cut back from 71st Street to Court Square, 14 peak hour trains would operate. (2) A W/Q Northern Boulevard local (7 trains) operates from LaGuardia via 63rd and 6th Avenue (with 14 V/Q trains, the W/Q service would use the express tracks and run to Bergen Street. Alternatively, 7 to 10 V/Q trains could run via the express tracks, and the remaining V/Q and W/Q service could turn back at 2nd Avenue). (3) R service (14 trains) would begin at 71st Avenue. (4) There is no change in E, F, N and 7 services. The G service could operate from 71st or be cut back at Court Square.

With the G service continuing to 71st Avenue, some 14 peak hour trains would use the 63rd Street tunnel. With the G service cut back to Court Square, 21 trains would operate via the 63rd Street tunnel.



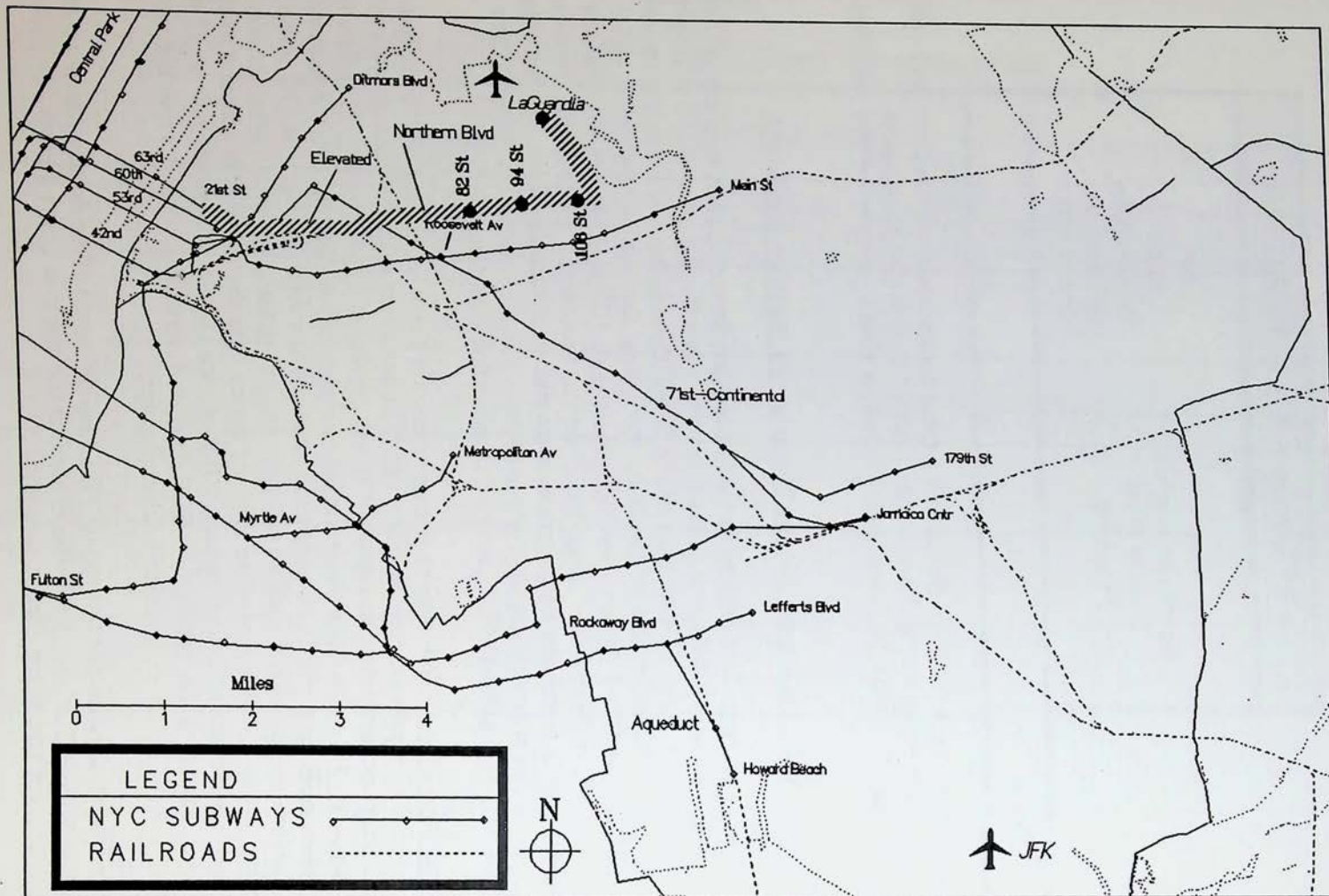


Figure 4-12

Option 2-8: LaGuardia Extension Via Northern Boulevard

Table 4-25

## Operating Plan - Option 2-8: LaGuardia Extension Via Northern Boulevard

| LINE               | QUEENS       |               |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE         | OTHER TERMINAL                         |
|--------------------|--------------|---------------|---------|-------------------|----------------|----------------------------|----------------------------------------|
|                    | TERMINAL     | ROUTE         | SERVICE |                   |                |                            |                                        |
| E                  | Jamaica Cntr | Queens Blvd   | Express | 53rd              | 14             | 8th Ave local              | World trade Center                     |
| F                  | 179th        | Queens Blvd   | Express | 53rd              | 14             | 6th Ave local              | Coney Island/Kings Hwy<br>via Culver   |
| V/Q <sup>1,2</sup> | 179th        | Queens Blvd   | Local   | 63rd              | 7              | 6th Ave local <sup>1</sup> | Brighton Beach via<br>Brighton express |
| W/Q <sup>1,2</sup> | LaGuardia    | Northern Blvd | Local   | 63rd              | 7              | 6th Ave local <sup>1</sup> |                                        |
| R                  | 71st         | Queens Blvd   | Local   | 60th              | 14             | Broadway local             | 95th St via 4th Ave local              |
| N                  | Ditmars      | 31st St       | Local   | 60th              | 14             | Broadway express           | Coney Island via<br>Sea Beach express  |
| G                  | 71st         | Queens Blvd   | Local   | --                | 7              | Queens Bklyn crosstown     | Smith - 9th streets                    |
| 7                  | Main St      | Roosevelt Ave | Local   | 42nd              | 14             | 42nd St                    | Times Square                           |
| 7                  | Main St      | Roosevelt Ave | Express | 42nd              | 14             | 42nd St                    | Times Square                           |

<sup>1</sup> B via 6th Ave local if Q is rerouted to Upper Manhattan. Some trains may turn back at 2nd Avenue.

<sup>2</sup> If G is cut back to Court Square, then V/Q could operate 14 trains.

W/Q via 6th Ave local to 2nd Ave (if B replaces Q, then W operates via 6th Ave express and B via 6th Ave local).

3. Ridership. Table 4-26 gives anticipated A.M. peak hour ridership, assuming that the G service continues to 71st Avenue in Forest Hills. The LaGuardia extension would result in about 5000 additional peak hour riders crossing the East River; 3000 from LaGuardia Airport and 2000 from along Northern Boulevard. The V/Q and W/Q service would carry 20,000 riders through the 63rd Street tunnel; both routes would operate slightly above their desirable capacity.<sup>8</sup> Consequently, there would be only minimum relief to the 53rd Street tunnel, which would have 46,000 peak hour passengers. The 60th Street tunnel would have 34,000 riders, and the 42nd Street tunnel would carry 35,000.

Because of the resulting overcrowding of the V/Q, W/Q, E, and F trains, the ridership impacts of a cutback of G service to Court Square were also analyzed. The resulting ridership estimates are shown in Table 4-27. The operation of 14, rather than 7 V/Q trains from 179th Street results in a greater ridership through the 63rd Street tunnel, less overcrowding on V/Q, E and F trains, and a better distribution of peak hour riders among the four river crossings.

The 63rd Street tunnel would carry 24,000 riders (versus a capacity of 29,400), the 60th Street tunnel 34,000 riders, the 53rd Street tunnel 42,000 riders, and the Steinway (42nd Street) tunnel, 35,000 riders.

4. Costs. Estimated costs for the Northern Boulevard - LaGuardia line are \$1.2 billion. These costs are in addition to those for the planned Queens Boulevard connection.

5. Institutional and Environmental Considerations. The Northern Boulevard subway provides an important link between LaGuardia Airport and Midtown. Because of its benefits to airport workers and travelers, equity considerations suggest that part of the costs should be borne by the Port Authority of New York and New Jersey.

6. Assessment. This option provides direct service between Midtown Manhattan and LaGuardia Airport. Running times between the airport and midtown would be less than 20 minutes. The option also provides better service to the apartment complexes along Northern Boulevard. Accordingly, it relieves the heavily traveled inner part of the Flushing elevated line.

The option has several significant disadvantages. Its development costs are high yet it provides little to benefit to Eastern Queens. Unless the G service is cut back at Court Square, it would afford less relief than the planned Northern Boulevard connection. Even with such a cutback, the additional investment buys improved access in the Flushing-LaGuardia corridors, rather than along Queens Boulevard.

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<sup>8</sup> Estimated Northern Boulevard A.M. peak hour riders by station are: LaGuardia stations, 3000; 108th Street, 1500; Junction Boulevard, 2000; 82nd Street, 1500.



Table 4-26

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 2-8(a): Northern Boulevard Extension to LaGuardia Airport**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q(a)      | 7      | 9,800    | 10,000              | 1.02         |
|             |          |                                                    | V/Q(b)      | 7      | 9,800    | 10,000              | 1.02         |
|             | subtotal | 3000                                               | subtotal    | 14     | 19,600   | 20,000              | 1.02         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 23,000              | 1.17         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 22,000              | 1.17         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 46,000              | 1.17         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 35,000              | 1.03         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 35,000              | 1.03         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 131,880  | 135,000             | 1.02         |

NOTE: Works only if 14 trains to 179th Street; G cut back at Court Square.

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

(a) 179th Street

(b) Rockaways

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

Table 4-27

**Year 2000 AM Peak Hour Inbound Riders Across East River**  
**Option 2-8(b): Northern Boulevard Extension to LaGuardia, G Cut Back at Court Square**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 15,000              | 0.77         |
|             |          |                                                    | W/Q         | 7      | 9,800    | 9,000               | 0.92         |
|             | subtotal | 3000                                               | subtotal    | 14     | 29,400   | 24,000              | 0.82         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.07         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 35,000              | 1.03         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 35,000              | 1.03         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 131,880  | 133,000             | 0.95         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

(a) to 179th Street

(b) via Northern Boulevard

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

## Option 2-9. LaGuardia Airport Extension.

1. Plan Features. This option provides a more direct connection between the 63rd Street subway and LaGuardia Airport than Option 2-8. Figure 4-13 shows the suggested alignment which follows the north side of the Sunnyside Yards area (elevated), the Amtrak Hell Gate-Bridge route (elevated), a high crossing of the elevated Conrail freight line, the east side of the Brooklyn Queens Expressway (elevated) and descending to the airport service road system (mainly subway) to pass under the flight path. Stations are provided at the Trump Shuttle Terminal, Main Terminal and Northern Boulevard (transfer to IND).

2. Service Plan. The service plan shown in Table 4-28 is generally similar to that for Option 1-1; the E, F, N and 7 services are unchanged. The R service begins at 179th Street, the G service is cut back to Court Square, and the V/Q service (14 trains) operates via the Queens Boulevard local tracks and the 63rd Street tunnel and 6th Avenue (7 to 10 via express tracks to Coney Island; the remainder via local tracks to 2nd Avenue<sup>9</sup>). In addition, a new W airport service (7 trains) operates via the 63rd Street tunnel and the 6th Avenue local tracks to 2nd Avenue. Thus 21 trains would operate through the 63rd Street tunnel.

3. Ridership. Table 4-29 gives AM peak hour ridership by route and river crossing. The extension to LaGuardia would attract about 3000 new peak-hour passengers. However, since the W LaGuardia trains would make no stops between the Airport and 21st Avenue, they would carry only 5000 riders across the East River. This results in a capacity utilization of about 50 percent.

The anticipated passengers by river crossing are: 63rd Street, 19,000; 60th Street, 34,000; 53rd Street, 19,000; and 42nd Street, 36,000.

4. Costs. Anticipated costs are \$750 million. These costs are in addition to those for the planned Northern Boulevard connection.

5. Institutional and Environmental Considerations. This option would provide major benefit to workers, visitors, and travelers using LaGuardia Airport. Thus, equity considerations support that the Port Authority should help offset its development costs.

6. Assessment. This option provide direct service to LaGuardia Airport, resulting in journey times under 20 minutes to Midtown. It results in 21 peak hour trains through the 63rd Street tunnel, although many of the trains would be lightly used.

From the perspective of providing capacity relief to the Queens Boulevard and Flushing corridors, this plan does little. It makes sense only if there is a policy decision and cost sharing commitment to provide subway service to the airport.

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<sup>9</sup> To improve passenger clarity, the V/Q trains to and from 2nd Avenue could be designated as "V," and the Brighton Beach trains as Q.



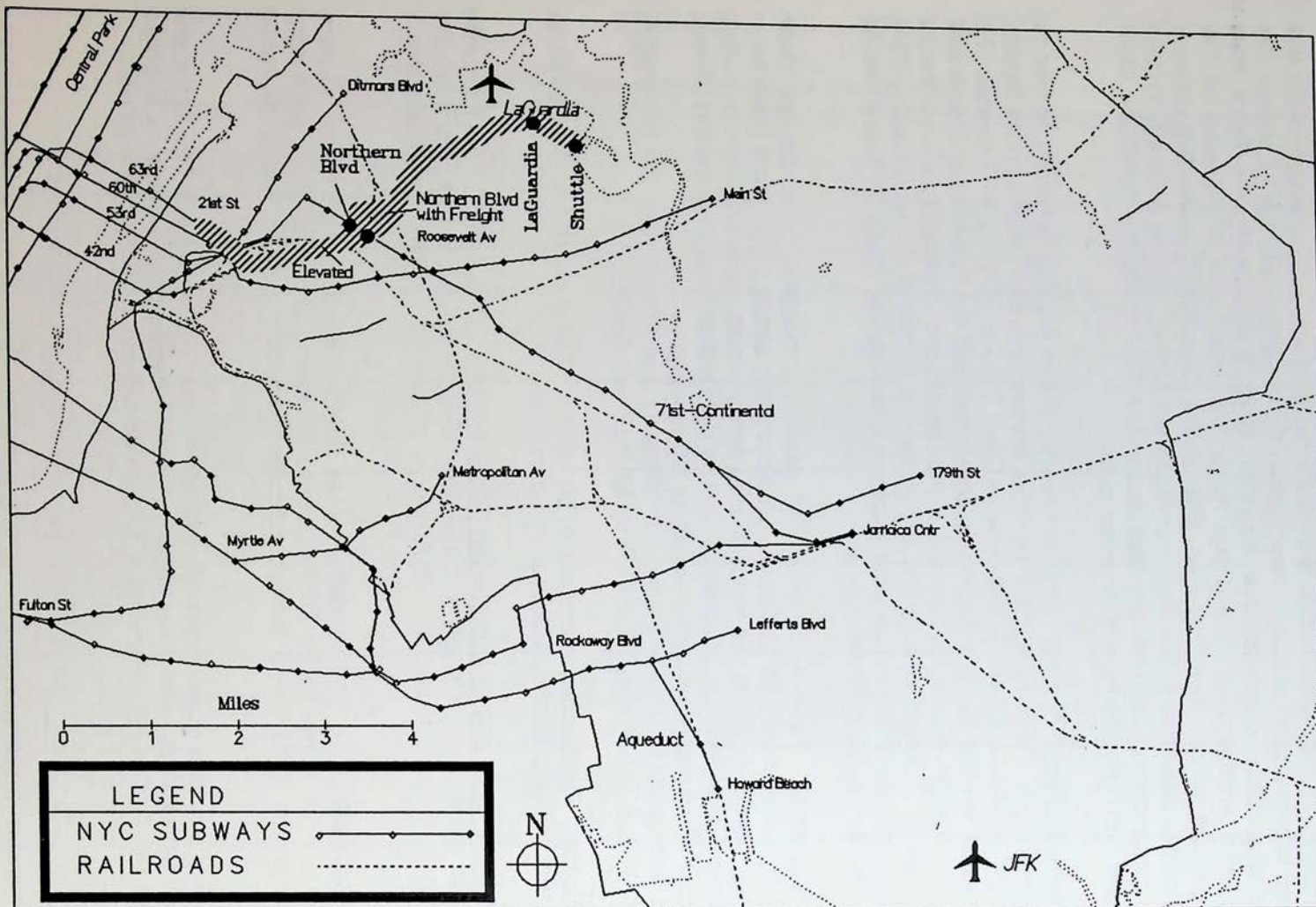


Figure 4-13

Option 2-9: LaGuardia Extension

Table 4-28

**Operating Plan - Option 2-9: LaGuardia Extension  
(Inbound AM Peak Hour)**

| LINE             | QUEENS       |                           |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE       | OTHER TERMINAL                         |
|------------------|--------------|---------------------------|---------|-------------------|----------------|--------------------------|----------------------------------------|
|                  | TERMINAL     | ROUTE                     | SERVICE |                   |                |                          |                                        |
| E                | Jamaica Cntr | Queens Blvd               | Express | 53rd              | 14             | 8th Ave local            | World Trade Center                     |
| F                | 179th St     | Queens Blvd               | Express | 53rd              | 14             | 6th Ave local            | Coney Island/Kings Hwy<br>via Culver   |
| V/Q <sup>1</sup> | 179th St     | Queens Blvd               | Local   | 63rd              | 14             | 6th Ave<br>local/express | Brighton Beach via<br>Brighton express |
| W                | LaGuardia    | BQE                       | Local   | 63rd              | 7              | 6th Ave local            | 2nd Ave                                |
| R                | 71st         | Queens Blvd               | Local   | 60th              | 14             | Broadway local           | 95th St via 4th Ave local              |
| N                | Ditmars Blvd | 31st Ave                  | Local   | 60th              | 14             | Broadway express         | Coney Island via Sea<br>Beach express  |
| G                | Court St     | Queens Bklyn<br>crosstown | Local   | --                | 7              | ---                      | Smith - 9th streets                    |
| 7                | Main St      | Roosevelt Ave             | Local   | 42nd              | 14             | 42nd St                  | Times Square                           |
| 7                | Main St      | Roosevelt Ave             | Express | 42nd              | 14             | 42nd St                  | Times Square                           |

<sup>1</sup> Via B and 6th Ave local/express if Q is routed to Upper Manhattan. Some trains may turn back at 2nd Avenue or Bergen Street.

Table 4-29

Year 2000 AM Peak Hour Inbound Riders Across East River  
Options 2-9: LaGuardia Extension

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 14,000              | 0.71         |
|             |          |                                                    | W/Q         | 7      | 9,800    | 5,000               | 0.51         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 19,000              | 0.65         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 22,000              | 1.12         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 22,000              | 1.12         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 44,000              | 1.12         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 133,000             | 0.94         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.



Operationally, in both options 2-8 and 2-9, the LaGuardia service should operate over the Broadway line in Manhattan. This achieves better use of trunk line tracks; but it misses the Rockefeller Center Sixth Avenue market. Thus, the service was kept on 6th Avenue.

### **3 - LONG ISLAND RAIL ROAD OPTIONS.**

This group of options addresses the feasibility of integrating NYCTA subway and LIRR services, converting portions of the LIRR to subway operation, and/or extending the LIRR via the lower level of the 63rd Street tunnel into Manhattan. Given the extensive LIRR infrastructure in Queens, Nassau, and Suffolk counties, and the extensive subway system across the East River and in much of Queens, providing a better mix of services -at least conceptually, could increase capacity in a cost-effective manner.

The concept of "joint running" has been given much study in past years, as a means of achieving these objectives. However, it poses many institutional and operating problems that make it impractical to consider. These problems include: (1) different regulating agencies, (2) different labor unions, (3) differing signal systems (subways use wayside block signals; the LIRR uses cab signals) differing car strengths and anteclimber heights; different fare structures and fare collection practices; and differing modes of operation (schedule versus headway).

Some of these problems have, of course, been worked out in the past on other systems. Interstate, interurban trains ran on the Chicago elevated tracks and rapid transit cars in several cities use both wayside and cab signals. Integrated fare systems may become more feasible as automatic fare collection equipment becomes a reality in the New York area over the next decade.

Even if the institutional problems were resolved, joint running through Jamaica would be difficult. Jamaica is currently a problem area for the Long Island Rail Road, and the introduction of high-frequency rapid transit service could result in greater train delays. Finally, the LIRR has decided not to build a "flyover" at Jamaica because of the high costs involved.

Accordingly, the concept of joint running has not been included in the options that follow.

Option 3-1, suggests a Long Island City transfer between the 63rd Street tunnel and the Main line. Options 3-2, 3-3 and 3-4 involve conversions of the Montauk branch, Port Washington branch, and Main line - Atlantic branch, to subway operation. Option 3-5 calls for a LIRR railroad extension to east Midtown Manhattan.

#### **Option 3-1. Long Island City - LIRR Transfer.**

1. Plan Features. This plan calls for developing a transfer station between the 63rd Street subway line and the Long Island Railroad in Sunnyside Yards. An across-the-platform, or two level transfer (subway on one level, LIRR on the other) would be provided between the subway and LIRR services. Special low-fare Long Island Railroad turnback services would operate from this terminal to Rosedale, Queens Village and Great Neck. To provide sufficient track space, it may be necessary to shift diesel trains to the Montauk branch. This concept is similar to the 1984 Montauk Transfer Plan.

2. Service Plan. Seven NYCTA trains could serve the transfer, assuming that 14 trains are routed from 63rd Street to Queens Boulevard. Without the Queens Boulevard connection, up to 14 peak hour trains could serve the transfer station.

3. Ridership. the 1978 Queens Transit Alternatives studies indicated that the transfer might relieve the E/F services of up to 5000 people in the AM peak hour. The inconvenience of changing trains limited the ridership potentials.

4. Costs. Costs are estimated at \$400 million at 1990 levels. About \$200 million would be in addition to the costs of the Queens Boulevard connection.

5. Institutional and Environmental Considerations. The MTA would have to work out the details of the LIRR low-fare cost structure and the transfer arrangements with its two constituent agencies, the LIRR and NYCTA.

6. Assessment. This option has several serious deficiencies that limit its practicality. (1) Finding space for a suitably attractive transfer in Sunnyside Yards would be difficult. (2) More significantly, the connection would afford relatively little relief to the overcrowded E and F trains, while simultaneously complicating LIRR and subway operations. This would be especially true after the Northern Boulevard connection is completed. The concept should not be given further consideration.

#### Option 3-2. 63rd Street Connection to Montauk Branch.

1. Plan Features. This option would connect the 63rd Street subway to the Montauk Branch of the Long Island Railroad. A second connection would be made to the Jamaica El in the Lefferts Boulevard-Richmond Hill area. This concept is similar to the 1984 Montauk/Archer plan. The Montauk Branch would be electrified and a block signal system would be provided for NYCTA operation. NYCTA trains would operate from Jamaica Center, via the Montauk Branch and 63rd Street tunnel to Manhattan. LIRR freight service would be limited to late night, and the passenger trains would be rerouted over the Main line. As shown in Figure 4-14, stations would be provided, as at present, at Richmond Hill, Glendale/Woodhaven, Metropolitan, Fresh Pond, and perhaps Maspeth.

2. Service Plan. The service plan is shown in Table 4-30. A new V/Q service (14 trains) operates via the Montauk Branch, the 63rd Street tunnel and the Sixth Avenue local tracks. A new W service (7 trains) operates from 179th Street via the Queens Boulevard local, 63rd Street, and the Broadway local tracks to Whitehall Street. The R service (14 trains) starts at 71st Avenue. The E, F, N, G, and 7 services are unchanged. Thus, 21 trains would operate via 63rd Street.

3. Ridership. Table 4-31 shows anticipated A.M. peak hour ridership by route and river crossing. The Montauk line is expected to bring another 5000 riders across the East River. 2000 would be diverted from the existing LIRR, 500 from the Metropolitan Avenue station of the Myrtle L, and 2500 would be new riders.



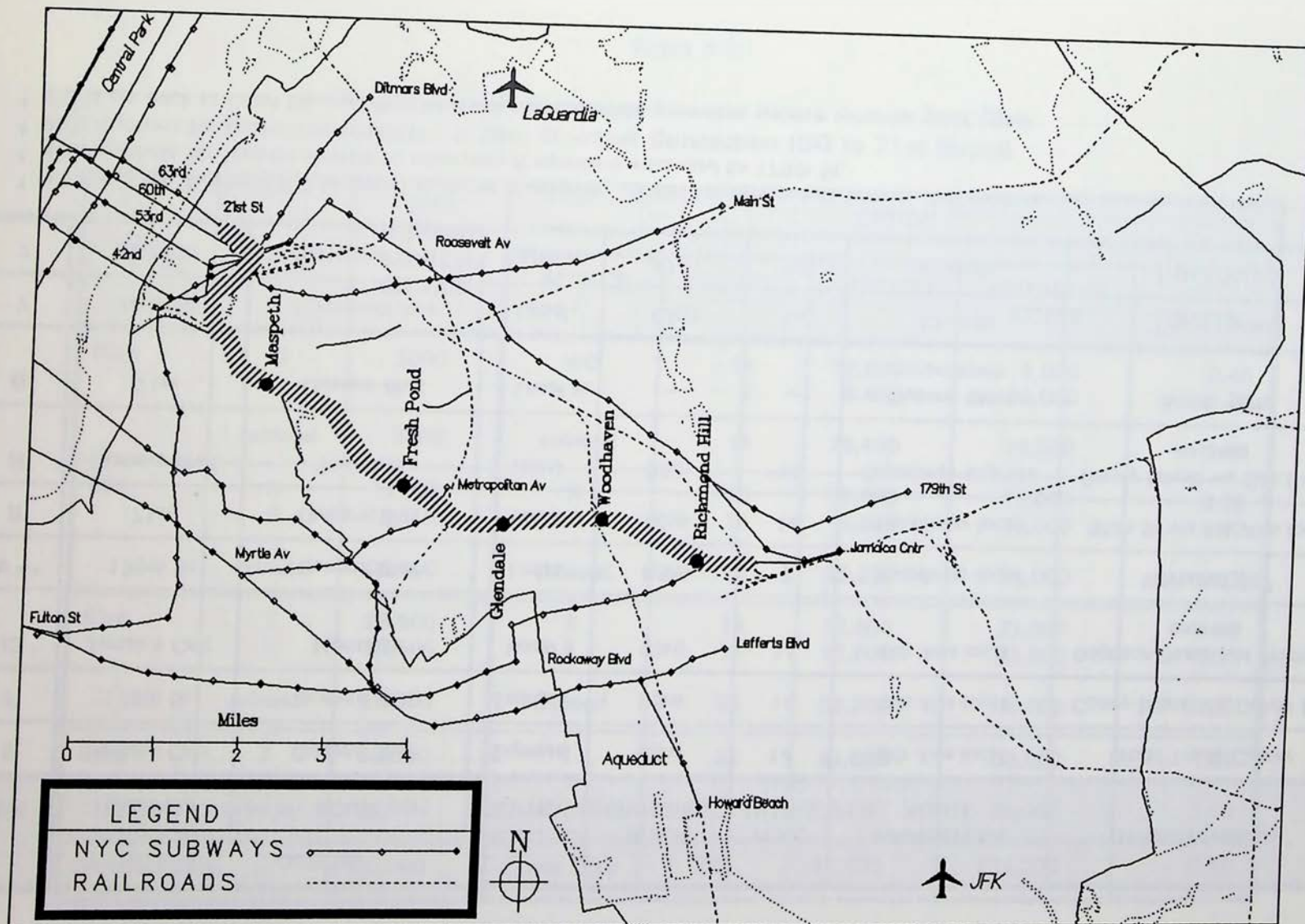


Figure 4-14

Option 3-2: 63rd Street Connection to Montauk Branch



Table 4-30

Operating Plan - Option 3-2: 63rd Street to Montauk Branch Connection  
(Inbound AM Peak Hour)

| LINE             | QUEENS       |               |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE     | OTHER TERMINAL                      |
|------------------|--------------|---------------|---------|-------------------|----------------|------------------------|-------------------------------------|
|                  | TERMINAL     | ROUTE         | SERVICE |                   |                |                        |                                     |
| E                | Jamaica Cntr | Queens Blvd   | Express | 53rd              | 14             | 8th Ave local          | World Trade Center                  |
| F                | 179th St     | Queens Blvd   | Express | 53rd              | 14             | 6th Ave local          | Coney Island via Culver line        |
| V/Q <sup>1</sup> | Jamaica Cntr | Montauk       | Local   | 63rd              | 14             | 6th Ave local          | Brighton Beach via Brighton express |
| W <sup>2,4</sup> | 179th St     | Queens Blvd   | Local   | 63rd              | 7              | Broadway local         | Whitehall St <sup>2</sup>           |
| R                | 71st         | Queens Blvd   | Local   | 60th              | 14             | Broadway local         | 95th St via 4th Ave local           |
| N                | Ditmars Blvd | 31st Ave      | Local   | 60th              | 14             | Broadway express       | Coney Island via Sea Beach express  |
| G                | 71st         | Queens Blvd   | Local   | --                | --             | Queens Bklyn crosstown | Smith - 9th                         |
| 7                | Main St      | Roosevelt Ave | Local   | 42nd              | 14             | 42nd St                | Times Square                        |
| 7                | Main St      | Roosevelt Ave | Express | 42nd              | 14             | 42nd St                | Times Square                        |

<sup>1</sup> Via B and 6th Ave local if Q is routed to Upper Manhattan. Some trains may turn back at 2nd Avenue.

<sup>2</sup> With Northern Boulevard connection; otherwise R service is extended to 179th St.

<sup>3</sup> With Northern Boulevard connection.

<sup>4</sup> If G is cut back at Court Square, then 14 trains could operate.

Table 4-31

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 3-2(a): Montauk Connection (GG to 71st Street)**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 9,000               | 0.46         |
|             |          |                                                    | W           | 7      | 9,800    | 10,000              | 1.22         |
|             | subtotal | 3000                                               | subtotal    | 14     | 29,400   | 19,000              | 0.65         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 23,000              | 1.17         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 23,000              | 1.17         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 46,000              | 1.17         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 135,000             | 0.95         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

Ridership west of 21st Avenue on the V/Q Montauk service would total 9000 as compared with a capacity of 19,600. In contrast, the W service would have 10,000 riders, as compared with a capacity of 9800. The E and F trains using the 53rd Street tunnel would carry 46,000 riders; the relatively little relief afforded to these lines is because (1) the Montauk line serves another corridor and draws most of its riders from other sources, and (2) only seven additional trains operate to Manhattan from Queens Boulevard.

Accordingly, an alternate service plan was developed that brings riders and train capacity into better balance. This service plan:

- terminates the G service at Court Square.
- operates 14 V/Q trains from 179th Street via the Queens Boulevard local, 63rd Street and Sixth Avenue local. (Some of these trains would turn back at 2nd Avenue Manhattan.)
- operates 7 W trains from Jamaica Center via the Montauk Branch, 63rd Street and Broadway local to Whitehall Street.

Table 4-32 gives the A.M. peak hour ridership for this alternate service plan. The plan brings ridership and capacity into better balance. Use of the 63rd Street tunnel is increased to 24,000 passengers, while use of the 53rd Street tunnel is reduced to 42,000 passengers.

4. Costs. Estimated costs are \$550 million. (These costs are in addition to those for the Northern Boulevard connection.)

5. Institutional and Environmental Considerations. This option involves participation of the LIRR, including changes in its freight services. Residents of communities located along the Montauk Branch have opposed NYCTA services.

6. Assessment. The Montauk-Archer connection provides direct subway service to Manhattan from the Richmond Hill and Glendale areas that are currently unserved. Yet, it is these very areas that have objected to this line in the past.

This option has several disadvantages. (1) It results in an awkward alignment between 63rd Street and the Montauk Branch, including difficult and costly construction. (2) It saves no time between Jamaica Center and Manhattan over the E service; both have the same number of stations, but the E train is more direct. (3) The main sources of riders are along the Montauk corridor. Thus, relatively little relief is afforded to the Queens Boulevard beyond that provided by the planned connection. (4) Existing LIRR freight and passenger services are adversely affected. (5) Grade crossings along the line would pose safety problems.



Table 4-32

**Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 3-2(b): Montauk Connection (With G Terminated at Court Square)**

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q (a)     | 14     | 19,600   | 16,000              | 0.81         |
|             |          |                                                    | W (b)       | 7      | 9,800    | 8,000               | 0.82         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 24,000              | 0.82         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 15,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 33,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 21,000              | 1.07         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 21,000              | 1.07         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 42,000              | 1.07         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 133,000             | 0.95         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

(a) From 179th Street via Queens Boulevard local and 6th Avenue express.

(b) From Jamaica Center via Montauk, and Boardway local.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

### Option 3-3. 63rd Street Connection to Port Washington Branch

1. Plan Features. This option connects the 63rd Street tunnel to the Port Washington Branch of the LIRR (in addition to Queens Boulevard). The branch is converted to NYCTA operations, with "local" trains terminating at Little Neck and "express" trains continuing to Port Washington. The underlying rationale is: (1) to increase use of the 63rd Street tunnel, (2) expand high-frequency low-fare subway service to northeastern Queens, and (3) complement the added capacity in the Queens Boulevard corridor.

Figure 4-15 depicts the proposed connection. The 63rd Street subway is extended as an aerial structure along the north side of Sunnyside Yards. West of Woodside, a connection is made to the Port Washington Branch. NYCTA block signals would be installed on the Port Washington Branch. Crossovers would be provided in the Little Neck area to turn trains around along with necessary storage tracks. The cars used on the line would have special interior designs and low load factors (passengers per seat). (A similar type service, the Evanston Express, is provided by the Chicago Transit Authority.) Cars would be capable of top speeds of about 70 MPH.

The NYCTA fare would apply for service within New York City. An additional surcharge, or preferably a zone fare would apply for the four stations in Nassau County.

2. Service Plan. The service plan is shown in Table 4-33. (1) A new P express service (7 trains) operates between Port Washington and Second Avenue Manhattan via the Port Washington Branch, 63rd Street tunnel and 6th Avenue local tracks. It would run express from Little Neck to 21st Avenue, although certain trains might stop at Flushing. (2) A new P local service (7 trains) operates between Little Neck and 2nd Avenue via the Port Washington Branch and 63rd Street tunnel, and 6th Avenue local. The 2nd Avenue terminal in Manhattan avoids interlining Port Washington and Coney Island - Brooklyn services. (2) A new V/Q service (7 trains) would operate from 179th Street to Brighton Beach via the Queens Boulevard local and 63rd Street tunnel and Broadway - 7th Avenue express. If the G service terminates at Court Square, another seven V/Q trains would operate. Otherwise, the additional Q service (up to 7 trains) would start at 21st Avenue and 57th Street, Manhattan and operate via the 6th Avenue express tracks. (3) The R service (14 trains) would operate through the 60th Street tunnel and would begin at 71st Avenue. Some of this service might start at 179th Street to maintain 14 local trains east of 71st - Continental Avenue. (4) There are no changes in the E, F, N, and 7 services. (5) The G trains would start at 71st Avenue, or they could be cut back at Court Square.

About 21 additional peak-hour trains would use the 63rd Street tunnel with the G service continuing to -71st Avenue and 28 additional trains with the G cutback to Court Square.<sup>10</sup>

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<sup>10</sup> Obviously, minor adjustments in R and V/Q service could be made to allow G service to continue to 71st Avenue and more V/Q service to 179th Street, i.e.: 12 R trains could start at 71st and G trains could start at 71st Avenue. Such fine tuning could come about once the option is adopted.



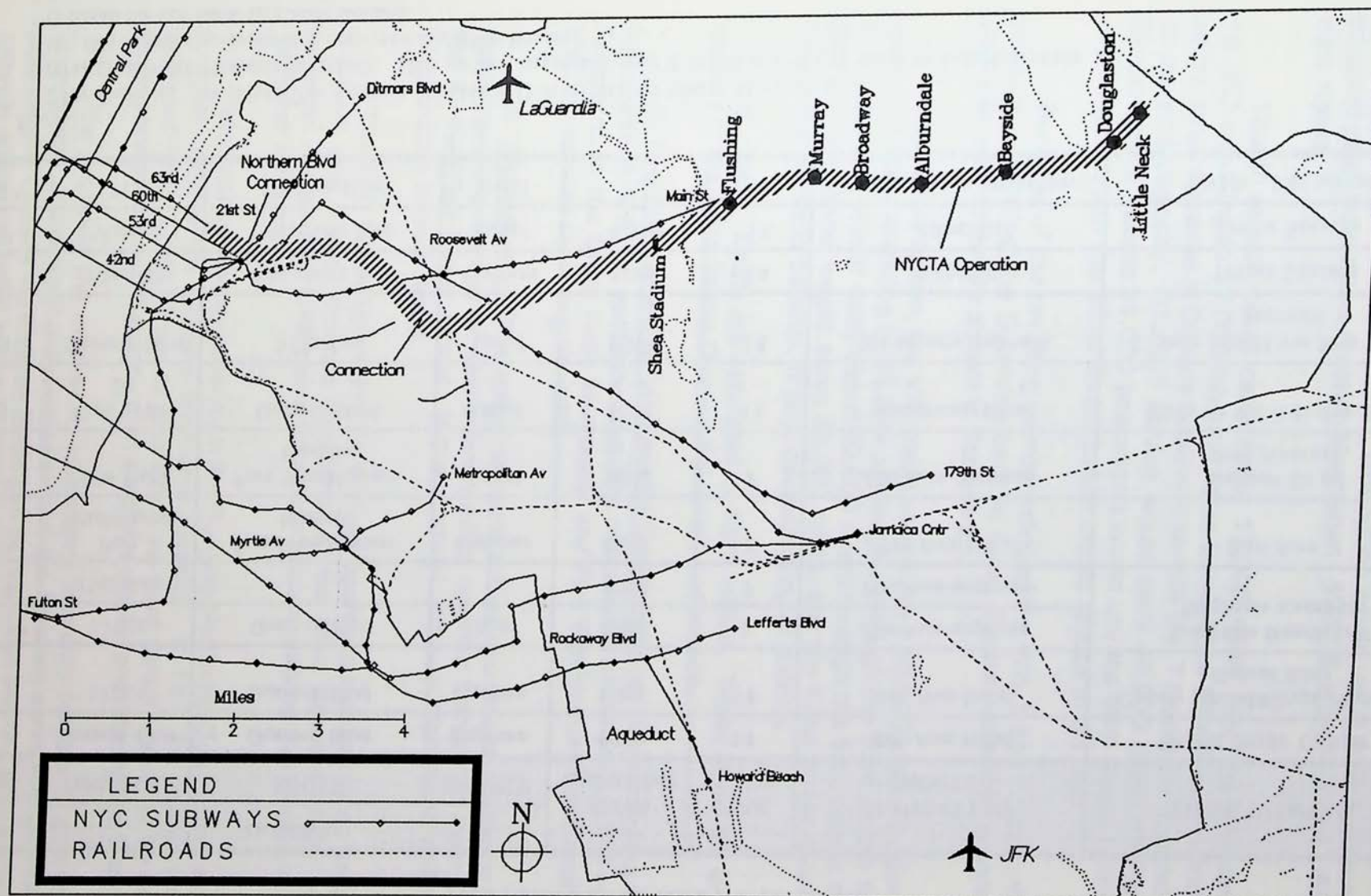


Figure 4-15

Option 3-2: 63rd Street Connection to Port Washington Branch



Table 4-33

**Operating Plan - Option 3-3: 63rd Street Connection to Port Washington Branch  
(Conversion to NYCTA Services)**

| LINE                | QUEENS             |                           |         | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN<br>ROUTE     | OTHER TERMINAL                            |
|---------------------|--------------------|---------------------------|---------|-------------------|----------------|------------------------|-------------------------------------------|
|                     | TERMINAL           | ROUTE                     | SERVICE |                   |                |                        |                                           |
| E                   | Jamaica Cntr       | Queens Blvd               | Express | 53rd              | 14             | 8th Ave local          | World Trade Center                        |
| F                   | 179th              | Queens Blvd               | Express | 53rd              | 14             | 6th Ave local          | Coney Island/Kings Hwy via<br>Culver line |
| V/Q <sup>1, 5</sup> | 179th              | Queens Blvd               | Local   | 63rd              | 7              | 7th Ave express        | Brighton Beach via<br>Brighton express    |
| Q <sup>2</sup>      | 21st Ave           |                           |         | 63rd              | 7              | 7th Ave express        |                                           |
| P <sup>3</sup>      | Port<br>Washington | Port Washington<br>branch | Express | 63rd              | 7              | 6th Ave local          | 2nd Ave                                   |
| P <sup>3</sup>      | Little Neck        | Port Washington<br>branch | Local   | 63rd              | 7              | 6th Ave express        | Bergen St or<br>2nd Avenue                |
| R                   | 71st/179th<br>St   | Queens Blvd               | Local   | 60th              | 14             | Broadway local         | 95th St via 4th ave local                 |
| N                   | Ditmars Blvd       | 31st Ave                  | Local   | 60th              | 14             | Broadway express       | Coney Island via Sea Beach<br>express     |
| 7                   | Main St            | Roosevelt Ave             | Express | 42nd              | 14             | 42nd St                | Times Square                              |
| 7                   | Main St            | Roosevelt Ave             | Local   | 42nd              | 14             | 42nd St                | Times Square                              |
| G <sup>4</sup>      | 71st               | Queens Blvd               | Local   | ---               | 7              | Queens Bklyn crosstown | Smith - 9th streets                       |

## Notes:

<sup>1</sup> 21st Avenue. Via B and 7th Avenue express if Q is routed to Upper Manhattan.

<sup>2</sup> 21st Queens (Bellmouth terminal). This service operates only if the G is not cut back at Court Square.

<sup>3</sup> Via 6th Avenue express if B operates via 63rd Street.

<sup>4</sup> G could be cut back to Court Square.

<sup>5</sup> 14 trains if G is cutback at Court Square.

3. Ridership. Table 4-34 gives anticipated A.M. peak hour ridership assuming continuation of G service to 71st. This option would result in an increase of 10,000 inbound peak-hour riders entering Manhattan - 8000 diverted from the LIRR and 2000 new riders.

The P service could carry about 17,000 riders, and the V/Q service about 10,000 resulting in 27,000 inbound riders through the 63rd Street tunnel. Because of the small increase in Queens Boulevard service (i.e. 7 trains) the V/Q would operate at beyond capacity. The E/F service would carry 46,000 riders through the 53rd Street tunnel. Some 34,000 passengers would use the 60th Street tunnel, Flushing ridership through the 42nd Street tunnel would reduce to 33,000.

Because of the resulting overcrowding of the V/Q, E and F trains, the ridership impacts of cutting the G service back to Court Square were also analyzed. These ridership estimates are shown in Table 4-35.

Under this option, the V/Q trains would carry 16,000 inbound riders and the P trains 17,000, resulting in 33,000 passengers through the 63rd Street tunnel. The E and F trains would carry about 40,000 riders through the 53rd Street tunnel. The 60th Street tunnel would serve 33,000 riders, and the 42nd Street tunnel, 33,000. Thus, there would be little, if any, overcrowding of tunnels.

4. Costs. Costs are estimated at \$520 million. These costs are in addition to those for the 63rd Street Queens Boulevard connection.

5. Institutional and Environmental Considerations. Implementing the change from LIRR to NYCTA operations requires cooperation of the MTA, LIRR and NYCTA. Residents in the Great Neck Manhasset and Port Washington areas might object to NYCTA service replacing the LIRR.

6. Assessment. This option expands subway service to northeast Queens. It maximizes the number of new subway riders entering Manhattan from Queens and use of the 63rd Street tunnel. It gives central Midtown Manhattan delivery to Port Washington branch riders.

The Port Washington NYCTA subway operation reduces loads on the number 7 trains, and it also reduces congestion at the Main Street subway terminal. It removes 7 peak-hour LIRR trains from Penn Station, making this track space available for other LIRR trains.

Increasing subway capacity in the Flushing-Northeast Queens corridor does not, in itself, relieve the Queens Boulevard corridor. If 12 - 14 additional trains are operated from 179th Street to Manhattan via 63rd Street - such as by cutting back the G service at Court Square - then adequate relief is provided to the E and F service.

By reducing the number of passengers boarding number 7 express trains at Main Street, it becomes practical to extend the Flushing service to Jewell Avenue in east central Queens via Kissena Boulevard as resources permit. This extension would provide additional relief to the Queens Boulevard corridor.

Table 4-34

Year 2000 AM Peak Hour Inbound Riders Across East River  
Options 3-3: Port Washington Branch Connection to 63rd Street (G to 71st Street)

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 7      | 9,800    | 10,000              | 1.02         |
|             |          |                                                    | P           | 14     | 19,600   | 17,000              | 0.71         |
|             | subtotal | 3000                                               | subtotal    | 21     | 29,400   | 27,000              | 0.95         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 23,000              | 1.17         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 23,000              | 1.17         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 46,000              | 1.17         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 33,000              | 0.97         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 33,000              | 0.97         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 141,680  | 140,000             | 0.99         |

<sup>1</sup>Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT. 10,000 additional trips across East River (8000 LIRR, 2000 new).

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.



Table 4-35

Year 2000 AM Peak Hour Inbound Riders Across East River  
Options 3-3: Port Washington Branch Connection to 63rd Street (G to Court Square)

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 16,000              | 0.82         |
|             |          |                                                    | P           | 14     | 19,600   | 17,000              | 0.87         |
|             | subtotal | 3000                                               | subtotal    | 28     | 39,200   | 33,000              | 0.84         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 20,000              | 1.02         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 20,000              | 1.02         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 40,000              | 1.02         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 33,000              | 0.97         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 33,000              | 0.97         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 105    | 151,480  | 140,000             | 0.92         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

The principal problems with the plan are mainly institutional and environmental. Community acceptance of NYCTA operation, especially by Nassau County riders would be essential. Consensus would be needed among the MTA, LIRR and NYCTA to make this option a reality.

#### **Option 3-4. Conversion of LIRR Main Line Tracks to NYCTA Operations**

1. **Plan Features.** The goal of this option is to take full advantage of the LIRR tracks and right-of-way for subway service. The principal features include: (1) connecting the 63rd Street subway to the two former LIRR tracks between Woodside and Rego Park; (2) rerouting LIRR diesel trains via the Montauk Branch; (3) operating all LIRR service on the two center LIRR tracks from Woodside to Jamaica, and operating NYCTA subway service via the two outer tracks (alternatively, to create joint NYCTA-LIRR running); (4) building a flyover for NYCTA tracks through the Jamaica area; (5) connecting the NYCTA to the Atlantic Avenue branch which would be converted to NYCTA operation to Springfield Gardens; and (6) possibly reactivating the Rockaway branch for subway service. Figure 4-16 depicts this option.

2. **Assessment.** this option was not analyzed in detail, because of the serious operating problems associated with it. Limiting LIRR trains to a single track each way between Jamaica and Rego Park is not workable, and would create a major bottleneck. Building flyover at Jamaica - to serve less than 10 peak hour NYCTA trains - is not really cost effective; moreover the LIRR has already discarded this concept.

The LIRR corridors, for the most part, miss much of the Queens Boulevard market. Thus, they would provide relatively little relief to the Queens Boulevard corridor. Accordingly, in view of the operating problems and limited transportation benefits, this option should be dropped from further consideration.

#### **Option 3-5. LIRR Connection to Midtown Manhattan**

1. **Plan Objectives.** The completed 63rd Street tunnel contains an unused lower level, that extends from Second Avenue, Manhattan to 29th Street, Queens, and was designed to bring LIRR trains into a new East Midtown Terminal in Manhattan. This 1.6-mile long lower level is a valuable asset that might cost a billion dollars to replicate. Although the cost of completing the needed connections is high, the project has important transportation benefits and should be viewed as a longer range, post-2000 improvement. Three alternatives were explored: (1) a connection to Grand Central Terminal, (2) a terminal at Third Avenue and 49th Street, (3) a new cross-Manhattan line, perhaps extended to New Jersey and/or connected to Amtrak's west side line.



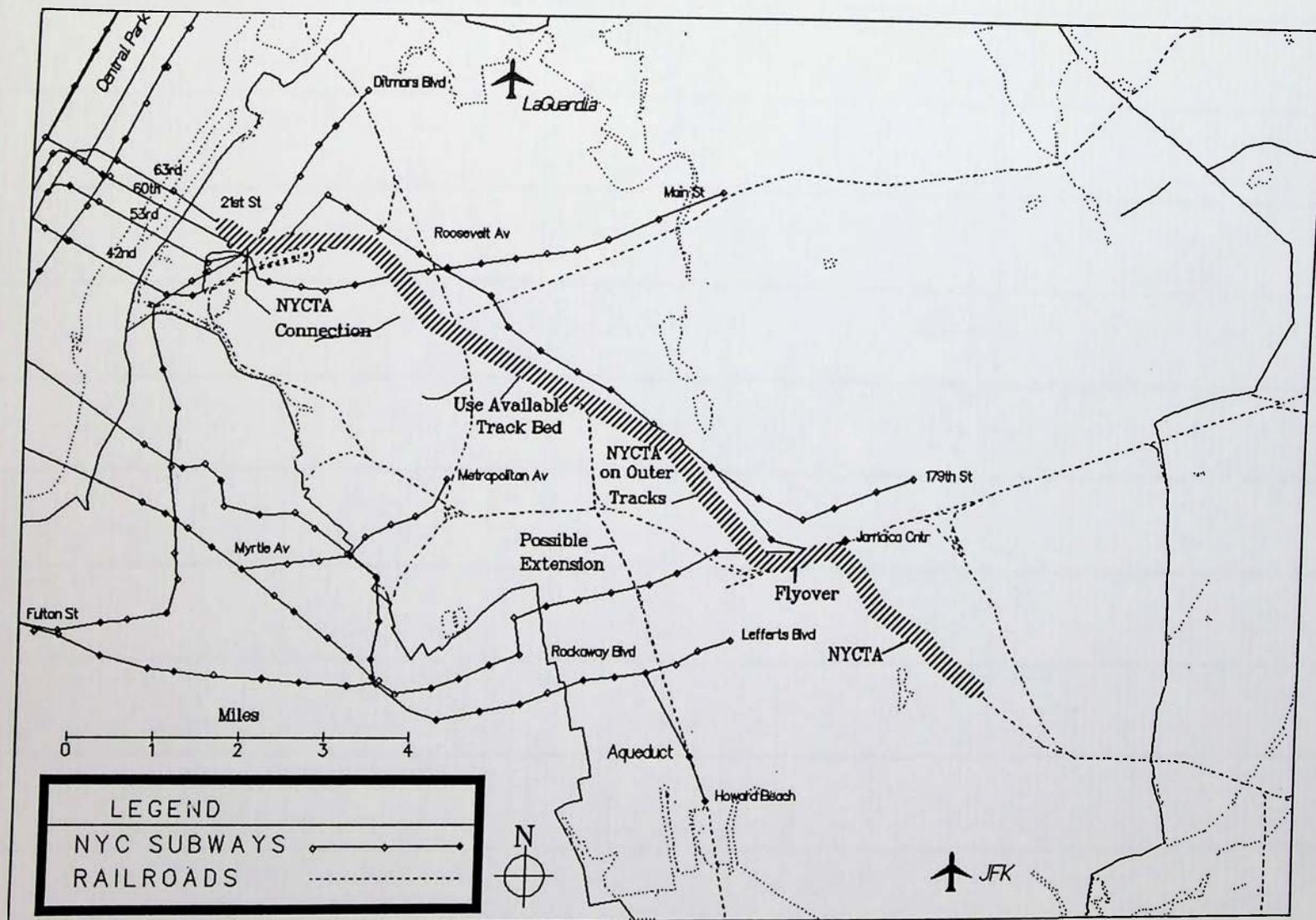


Figure 4-16

Option 3-2: Conversion of LIRR Tracks to Subway Operation



1. Grand Central Option. MTA commissioned a study of Grand Central as the location for the LIRR East Midtown Terminal in 1975 as an alternative to Third Avenue. The preferred scheme located five LIRR platforms on the west side of the lower level (in the Madison Avenue yard) and ten storage tracks on the east side of GCT. A rock tunnel largely under well-developed private property connected the terminal with the bellmouth provided in the 63rd Street tunnel at Second Avenue. The estimated cost in 1975 was \$322 million.

Option 3-5(1) contemplates a similar, but simpler, scheme with only three platforms and five tracks in the Madison Avenue yard. In lieu of storing LIRR trains in GCT, which would deprive Metro-North of most of the lower level, both the two-track approach tunnel and the lower level outer loop track would be used to return trains.

The estimated order-of-magnitude cost in 1990 dollars is about \$750 million. Since the previous study was made before Metro-North came into being, a final scheme can only be developed with Metro-North's participation.

2. Third Avenue Option. MTA's original concept (1968) was to place the LIRR East Midtown Terminal under Third Avenue centered on 49th Street. The preferred plan was a three-level station with two levels having four tracks and two platforms each, and an upper level mezzanine (somewhat similar to the West Fourth Street IND station, except for the location of the mezzanine). Twelve storage tracks, six on each level, extended south of the station to 41st Street. (Both the GCT and Third Avenue alternatives were designed for twelve-car, 1,020-ft long LIRR trains.) The estimated cost in 1975 was \$420 million.

Option 3-5(2) contemplates a simpler, less expensive, terminal having one track level with four tracks and two platforms without the costly storage tail tracks. The four-block-long platforms would be centered on 50th Street and the bumpers would be about 47th Street; alternatively, the terminal might be located between 54th and 57th Streets as the first step of implementing Alternative 3, the crosstown Option. This scaled-down terminal would have a capacity of about 20-24 trains per hour. The estimated order-of-magnitude cost in 1990 dollars is about \$600 million.

3. Crosstown Option. The third option employs a different concept. Instead of a terminal, the LIRR continues across Manhattan in new tunnels. To assure adequate track, platform, and station access/egress capacity, two, two-track tunnels, one across 49th Street, the other across 50th Street, may be needed ultimately. Initially, only one need be built. (Alternatively, a single two-level four track tunnel similar to the 63rd St. tunnel at Lexington Ave. might be considered.

- The connection from 63rd Street could be under Third Avenue or Second Avenue. Third Avenue would use the bellmouth already built, but the curves at 49th/50th Street would be under large buildings. Second Avenue would require a longer, very deep connection (over 100 feet), but the curves would be under "soft" property, and the construction could be coordinated with the future Second Avenue subway with a joint transfer station.
  - Three stations would be provided: Midtown East (54-57th Street), Rockefeller Center/Grand Central North (Madison Avenue-Rockefeller Plaza with pedestrian access to the Rockefeller Center concourses and Sixth Avenue subway), and Times Square North (Broadway-8th Avenue with access to the BMT, IRT and 8th Avenue subways). The Midtown East-Station would contain four tracks.
  - Services using the crosstown terminal should operate more like a modern suburban rail transit line rather than a conventional commuter rail service. Cars would need more doors and better performance. Stations probably would be shorter, perhaps 700 feet instead of 1,020 feet - long enough for 8-car trains (85-foot cars) or their equivalent.
  - The concept makes sense as part of a regional express rail system similar to the Paris RER or German S-bahn systems. For example, extending the tunnels to New Jersey is one of the options for a new trans-Hudson rail tunnel. A connection to Amtrak's west side line is also possible. These extensions would enlarge the area benefitting from the crosstown tunnels and costs could be shared.
  - The estimated order-of-magnitude cost in 1990 dollars from 63rd Street to 50th Street and 10th Avenue is about 1.1 billion. A second crosstown tunnel under 49th Street would add \$500 million. These estimates are for comparing alternatives; since more accurate estimates can be determined only after detailed engineering study.
4. Queens Connection. All of the options require connecting the 63rd Street tunnel and the LIRR in Queens. Previous studies were based on a four-track connection. The options presented in this report, however, are based on a simpler two-track connection. The estimated order-of-magnitude cost to complete the connection (from the Northern Boulevard bellmouth), and to equip the lower level of the completed 63rd Street tunnel (from Second Avenue) with track, signals, power, etc. is about \$600 million.
2. Costs. Estimated costs are summarized as follows
- (1) LIRR tunnel to 63rd Street connection in Queens, \$ 600 million
  - (2) Grand Central terminal link, \$ 750 million
  - (2) 3rd Avenue terminal at 50th Street, \$ 600 million
  - (3-a) 50th Street line, \$ 1.1 billion (from 63rd St. to 10th Ave., 3 stations)
  - (3-b) 49th Street line, \$ 0.5 billion (from 3rd Ave. and 50th St. to 10th Ave, 2 stations)

3. Institutional and Environmental Considerations. LIRR access to a new Midtown terminal would improve the development potentials of the upper Midtown area. Thus, it is reasonable to finance a part of the costs by establishing a special benefit-assessment district. One such district - the Grand Central Partnership - currently exists and could be the mechanism for establishing a funding base.

4. Assessment. This is an attractive, but costly option that, in view of the costs and construction complexity involved must be considered for a post-2000 project. When developed, part of its costs may be recovered from benefit-assessments to midtown buildings. The Grand Central option is probably the least costly. However, it may make more sense to provide midtown access part of a new east-west trans-Manhattan connection that integrates upgraded Metro-North and New Jersey Transit rail lines.



## CHAPTER 5

### ASSESSMENT OF IMPROVEMENT CONDITIONS

This chapter contains a comparative assessment of the Queens-Manhattan transit alternatives. It analyzes the cost, service, and other impacts associated with each option. Based on this comparative assessment, it certain options from further consideration and suggests transit improvements.

#### A. GENERAL OBSERVATION

The comparative assessment that the connection between the rayed Street line and the Queens Boulevard subway at Northern Boulevard will be built. The recommendation to proceed with this connection emerged from a decade-long series of studies. The DEIS has been approved, the FEIS is about ready, and detailed engineering has begun. To suggest another alternative at this juncture would set the clock back many years and delay badly needed transit relief to the Borough of Queens. The express-local connection, therefore, has been used as a benchmark against which other options can be compared.

If, however, it appears that construction of the project cannot begin due to lack of funds, the time can be used to evaluate a connection following a different alignment. The alternative connection would swing through LIRR Yard A and connect with the local and express tracks of the Queens Boulevard subway east of the 36th Street station (near Steinway Street), instead of west of the station. The revised alignment allows a simple-two track station to be built at Northern Boulevard (called Queens Plaza North). Half the station would be built in open cut in the parking lot. The station would include a straight-line transfer connection to the IND Queens Plaza station on the west side of Northern Boulevard.

While the alternative connection is longer than the approved connection, the cost should be about the same. The amount of difficult construction under operating subway tracks and traffic-congested Northern Boulevard is greatly reduced. Instead, much of the construction is in the open in the railroad yards. The need to build a costly by-pass track for the westbound IND local is avoided.

The main advantage of the alternative connection is the Queens Plaza North station. This area of Long Island City is growing and the station would serve new development. A complete transfer interchange would be available among all lines (especially if a Queens Plaza-Queensboro Plaza transfer connection were built). The station would go a long way to the goal of a Long Island City/Queens Plaza transportation center. Moreover, the station could be used as an off-peak terminal for 63rd Street trains when traffic volumes do not warrant through service (the transfer makes this possible). Accordingly, car-miles operated and operating costs would be lower. Finally, the station allows the project to be built in two stages if only partial funding is available. The first operable stage would be the station, the second, the connection itself.

The comparative assessment of the various options based on this alternative would, in all probability be similar to that for the approved alignment.

## **B. COMPARATIVE ASSESSMENT**

The comparative assessment of the Queens-Manhattan transit alternatives covers ridership, markets served, costs, operational flexibility, engineering implications, and institutional considerations.

Ridership. Comparative year 2000 AM peak hour ridership data for each option is summarized in Tables 5-1, 5-2, and 5-3.

- Table 5-1 contains ridership by option and river crossing. It also gives the total in-bound peak-hour capacity,
- Table 5-2, in turn, gives the trains using 63rd Street tunnel in each option, identifies the number and sources of new riders, and gives the relief expected on each river crossing.

The information contained in these tables provides a systematic ridership assessment for each option. The salient findings follow:

1. Trains through the 63rd Street tunnel. The number of trains entering Manhattan through the 63rd Street tunnel in the AM peak hour ranges from 14 (planned Queens Boulevard Connection - Option 1-1) to 28 (Port Washington Connection - Option 3-3). Most options route 21 trains through the tunnel.
2. Passenger Capacity. The total peak hour inbound capacity across the East River ranges from about 132,000 (Option 1 - Queens Boulevard Connection, and Option 2-7 (Queens Boulevard Connection east of Grand Avenue) to 151,000 (Option 3-3(b) 63rd Street-Port Washington Connection). The Queens Bypass (Option 2-2) has a capacity of 142,000, but could readily be increased to 151,000. Most other options have an aggregate capacity of 142,000. The year 2000 base demand is 130,000 and the year 2010 demand is 145,000.
3. Total Riders. The anticipated 2000 A.M. peak hour inbound riders reflects the attractiveness of the subway service and the ability to serve new markets. Ridership ranges from 130,000 to 140,000 people. The largest number of riders (140,000) are expected on the Queens Bypass - Springfield Gardens Extension (Option 2-5) and on the Port Washington NYCTA operation (Option 2-6). The Queens Bypass with an LIE extension (Option 2-6) has 137,000 riders, while the Queens Bypass-Rockaway-JFK line (Option 2-5) and the Northern Boulevard-LaGuardia line (Option 2-9) have 135,000 riders each.



Table 5-1

**Summary of Ridership Forecasts - Year 2000 East River Crossing  
(Inbound AM Peak Hour)**

| OPTION    | DESCRIPTION                                                                                   | Trains Using<br>63rd Street<br>Tunnel | CAPACITY | TUNNEL |        |        |        |         | G SERVICE<br>QUEENS<br>TERMINAL |
|-----------|-----------------------------------------------------------------------------------------------|---------------------------------------|----------|--------|--------|--------|--------|---------|---------------------------------|
|           |                                                                                               |                                       |          | 63rd   | 60th   | 53rd   | 42nd   | TOTAL   |                                 |
| 0         | No Build                                                                                      | 14                                    | 131,880  | 3,000  | 36,000 | 53,000 | 38,000 | 130,000 | 71st                            |
| 1-1 (a)   | 63rd St exp-local conn. (exp via 53rd)                                                        | 14                                    | 131,880  | 16,000 | 34,000 | 44,000 | 36,000 | 130,000 | Court Square                    |
| 1-1 (b)   | 63rd St exp-local conn. (exp via 53rd, 63rd)                                                  | 28                                    | 131,880  | 21,000 | 30,000 | 43,000 | 36,000 | 130,000 | Court Square                    |
| 1-2       | 63rd St conn. / reverse signaling                                                             | 21                                    | 141,680  | 25,000 | 33,000 | 40,000 | 36,000 | 134,000 | 71st                            |
| 1-3       | 63rd St conn. to Queens Blvd & crosstown line                                                 | 21                                    | 141,680  | 21,000 | 34,000 | 42,000 | 35,000 | 132,000 | Court Square                    |
| 1-4       | 63rd St conn.; 60th conn. to Flushing line express track                                      | 21                                    | 141,680  | 24,000 | 35,000 | 42,000 | 31,000 | 132,000 | Manhattan                       |
| 1-5       | 63rd St conn.; 60th St conn. to Flushing line; Flushing line relocated across Sunnyside Yards | 21                                    | 141,680  | 24,000 | 35,000 | 42,000 | 31,000 | 132,000 | Court Square                    |
| 1-6       | 63rd St conn., reversible 5th track at Roosevelt Ave; ext. to Rockaways                       | 21                                    | 141,680  | 23,000 | 33,000 | 41,000 | 36,000 | 133,000 | Court Square                    |
| 1-7       | 63rd St conn.; revised service pattern at Roosevelt; ext. to Rockaways                        | 21                                    | 141,680  | 22,000 | 35,000 | 40,000 | 36,000 | 133,000 | Court Square                    |
| 2 - 1,2,3 | Queens Bypass                                                                                 | 21                                    | 141,680  | 27,000 | 31,000 | 40,000 | 36,000 | 131,000 | 71st                            |
| 2-4       | Queens Bypass to Rockaway conn.                                                               | 21                                    | 141,680  | 19,000 | 34,000 | 46,000 | 36,000 | 135,000 | 71st                            |
| 2-5       | Queens Bypass-Springfield Gardens ext.                                                        | 21                                    | 141,680  | 28,000 | 34,000 | 42,000 | 36,000 | 140,000 | 71st                            |
| 2-6       | Queens Bypass to LIE ext.                                                                     | 21                                    | 141,680  | 27,000 | 33,000 | 42,000 | 34,000 | 136,000 | 71st                            |
| 2-7 (1)   | Queens Blvd conn. east of Grand Ave                                                           | 14                                    | 131,880  | 19,000 | 33,000 | 42,000 | 36,000 | 130,000 | Court Square                    |
| 2-7 (2)   | Queens Blvd conn. east of Grand Ave with ext. to Rockaways                                    | 14                                    | 131,880  | 19,000 | 34,000 | 44,000 | 36,000 | 133,000 | Roosevelt Ave                   |
| 2-8 (a)   | LaGuardia ext. via Northern Blvd                                                              | 21                                    | 131,880  | 20,000 | 34,000 | 46,000 | 35,000 | 135,000 | 71st                            |
| 2-8 (b)   | LaGuardia ext. via Northern Blvd                                                              | 21                                    | 141,680  | 24,000 | 34,000 | 42,000 | 35,000 | 135,000 | Court Square                    |
| 2-9       | LaGuardia ext. via BQE                                                                        | 21                                    | 141,680  | 19,000 | 34,000 | 44,000 | 36,000 | 133,000 | Court Square                    |
| 3-2 (a)   | 63rd St - Montauk Branch conn.                                                                | 21                                    | 141,680  | 19,000 | 34,000 | 36,000 | 36,000 | 135,000 | 71st                            |
| 3-2 (b)   | 63rd St - Montauk Branch conn.                                                                | 21                                    | 141,680  | 24,000 | 33,000 | 42,000 | 36,000 | 135,000 | Court Square                    |
| 3-3 (a)   | 63rd St - Port Washington conn.                                                               | 21                                    | 141,680  | 27,000 | 34,000 | 46,000 | 33,000 | 140,000 | 71st                            |
| 3-3 (b)   | 63rd St - Port Washington conn.                                                               | 28                                    | 151,480  | 33,000 | 34,000 | 40,000 | 33,000 | 140,000 | Court Square                    |



**Table 5-2**  
**Comparative Analysis of Ridership Impacts**  
**(Inbound AM Peak Hour; Year 2000)**

| OPTION<br>NUMBER | TRAINS USING<br>53rd ST<br>TUNNEL | QUEENS<br>TERMINAL FOR<br>G SERVICE | ADDITIONAL SUBWAY RIDERS<br>ACROSS EAST RIVER CORDON |                            |           |      | RELIEF AFFORDED<br>(Difference from No Build) |        |      |
|------------------|-----------------------------------|-------------------------------------|------------------------------------------------------|----------------------------|-----------|------|-----------------------------------------------|--------|------|
|                  |                                   |                                     | Total                                                | From Bklyn<br>subway lines | From LIRR | New  | 60th                                          | 53rd   | 42nd |
| 1-1 (a)          | 14                                | Court Sq                            | ---                                                  |                            |           |      | 2000                                          | 9,000  | 2000 |
| 1-1 (b)          | 14                                | Court Sq                            | ---                                                  |                            |           |      | 6000                                          | 10,000 | 2000 |
| 1-2              | 21                                | 71st                                | 4000                                                 | 4000 d                     | a         | a    | 3000                                          | 13,000 | 2000 |
| 1-3              | 21                                | Manhattan                           | 2000                                                 | 1200                       | 800       |      | 2000                                          | 11,000 | 3000 |
| 1-4              | 21                                | Court Sq                            | 2000                                                 |                            | 800       | 1200 | 1000                                          | 11,000 | 7000 |
| 1-5              | 21                                | Court Sq                            | 2000                                                 | a                          | a         | a    | 1000                                          | 11,000 | 1000 |
| 1-6              | 21                                | Court Sq                            | 3000                                                 | 1500                       | 700       | 800  | 3000                                          | 12,000 | 2000 |
| 1-7              | 21                                | Court Sq                            | 3000                                                 | 1500                       | 700       | 800  | 1000                                          | 13,000 | 2000 |
| 2-1              | 21                                | 71st                                | 4000                                                 | a                          | a         | a    | 5000                                          | 13000  | 2000 |
| 2-2              | 21                                | 71st                                | 4000                                                 | a                          | a         | a    | 5000                                          | 13000  | 2000 |
| 2-3              | 21                                | 71st                                | 4000                                                 | a                          | a         | a    | 5000                                          | 13000  | 2000 |
| 2-4              | 21                                | 71st                                | 5000                                                 | 1500                       | 700       | 2800 | 2000                                          | 7000   | 2000 |
| 2-5              | 21                                | 71st                                | 10000                                                | 4000 d                     | 2000      | 4000 | 2000                                          | 11000  | 2000 |
| 2-6              | 21                                | 71st                                | 7000                                                 | ---                        | ---       | 7000 | 3000                                          | 11000  | 4000 |
| 2-7 (a)          | 14                                | Court Sq                            | ---                                                  | ---                        | ---       | ---  | 3000                                          | 11000  | 2000 |
| 2-7 (b)          |                                   | Roosevelt Ave                       | 3000                                                 | 1500                       | 700       | 800  | 3000                                          | 9000   | 2000 |
| 2-8 (a)          | 14                                | 71st                                | 5000                                                 | ---                        | ---       | 5000 | 2000                                          | 7000   | 3000 |
| 2-8 (b)          |                                   | Court Sq                            | 5000                                                 | ---                        | ---       | 5000 | 2000                                          | 11000  | 3000 |
| 2-9              | 14                                | Court Sq                            | 3000                                                 | ---                        | ---       | 3000 | 2000                                          | 9000   | 2000 |
| 3-1 b            |                                   |                                     | ---                                                  | ---                        | ---       | ---  | 2000                                          | 9000   | 2000 |
| 3-2 (a)          | 21                                | 71st                                | 5000                                                 | 500                        | 2000      | 2500 | 2000                                          | 7000   | 2000 |
| 3-2 (b)          | 21                                | Court Sq                            | 5000                                                 | 500                        | 2000      | 2500 | 3000                                          | 7000   | 2000 |
| 3-3 (a)          | 21                                | 71st                                | 10000                                                | ---                        | 8000      | 2000 | 2000                                          | 10000  | 5000 |
| 3-3 (b)          | 28                                | Court Sq                            | 10000                                                | ---                        | 8000      | 2000 | 2000                                          | 10000  | 3000 |

Notes: (a) Not specified.  
(b) Assumed, no ridership forecasts.  
(c) No ridership forecasts for options 3-4 or 3-5.  
(d) Time shift from existing services.

Table 5-3

Anticipated Year 2000 Inbound AM Peak Hour Volume-to-Capacity Ratios

| OPTION        | 63rd St | 60th St | 53rd St | 42nd St | TOTAL |
|---------------|---------|---------|---------|---------|-------|
| 1-1 a         | 0.82    | 0.87    | 1.12    | 1.06    | 0.99  |
| 1-1 b         | 1.07    | 0.76    | 1.10    | 1.06    | 0.99  |
| 1-2           | 0.85    | 0.84    | 1.02    | 1.06    | 0.95  |
| 1-3           | 0.71    | 0.87    | 1.07    | 1.03    | 0.93  |
| 1-4           | 0.85    | 0.89    | 1.07    | 0.89    | 0.93  |
| 1-5           | 0.85    | 0.89    | 1.07    | 0.89    | 0.94  |
| 1-6           | 0.78    | 0.84    | 1.05    | 1.06    | 0.94  |
| 1-7           | 0.75    | 0.89    | 1.02    | 1.06    | 0.94  |
| 2-1, 2-2, 2-3 | 0.82    | 0.79    | 1.02    | 1.06    | 0.95  |
| 2-4           | 0.64    | 0.87    | 1.17    | 1.06    | 0.95  |
| 2-5           | 0.96    | 0.87    | 1.12    | 1.06    | 0.99  |
| 2-6           | 0.92    | 0.84    | 1.07    | 1.00    | 0.97  |
| 2-7 a         | 0.97    | 0.84    | 1.07    | 1.06    | 0.99  |
| 2-7 b         | 0.97    | 0.87    | 1.12    | 1.06    | 1.01  |
| 2-8 a         | 1.02    | 0.87    | 1.17    | 1.03    | 1.02  |
| 2-8 b         | 0.82    | 0.87    | 1.07    | 1.03    | 0.95  |
| 2-9           | 0.65    | 0.87    | 1.12    | 1.06    | 0.94  |
| 3-1           | ---     | ---     | ---     | ---     | ---   |
| 3-2 a         | 0.65    | 0.87    | 1.17    | 1.06    | 0.95  |
| 3-2 b         | 0.82    | 0.87    | 1.07    | 1.06    | 0.95  |
| 3-3 a         | 0.95    | 0.87    | 1.17    | 0.97    | 0.99  |
| 3-3 b         | 0.84    | 0.87    | 1.02    | 0.97    | 0.92  |
| 3-4           | ---     | ---     | ---     | ---     | ---   |
| 3-5           | ---     | ---     | ---     | ---     | ---   |



4. Use of 63rd Street Tunnel. The number of inbound peak hour passengers through the 63rd Street tunnel ranges from 16,000 (Queens Boulevard Connection, Option 1) to 33,000 (63rd Street-Port Washington Connection, Option 3-3b). The Queens Bypass with the Southeast Queens Connection (Option 2-5) results in 28,000 riders, while the Bypass and Bypass-LIE extensions (Options 2-2 and 2-6) result in 27,000 riders.

5. Relief Afforded. The relief afforded to the 53rd Street tunnel ranges from 9000 to 13,000 riders. The greatest relief is afforded when additional express services are operated to 179th Street (as in the case of the Queens Bypass options) or when 14 local trains are operated from 179th Street via the 63rd Street tunnel in conjunction with other service improvements. Options that result in 13,000 fewer trips include reverse running (Option 1-2) and the Queens Bypass (Option 2-2).

The relief provided to the 60th Street tunnel ranges from 2000 to 6000 people. The greatest relief is provided by the Queens Bypass, Option 2-2 (5000 riders), although the provision of express services via 63rd (as quantified for Option 1-1b) results in 6000 fewer trips.

The relief afforded to the Steinway tunnel ranges from 2000 to 7000 passengers. The greatest relief, 5000 and 7000 passengers respectively, results from the Port Washington Extension (Option 3-3) and the 60th Street connection to the Flushing express track (options 1-4 and 1-5).

Several options attract passengers from the LIRR, and thereby relieve the railroad. The greatest relief (8000 passengers) results from the Port Washington Connection (Option 3-3). The Montauk-Archer NYCTA operation (Option 3-2) and the Bypass-Southeast Queens Extension (Option 2-5) each attract 2000 LIRR peak hour riders.

6. Volume - Capacity Comparisons. The volume-capacity ratios by tunnel indicate that the 42nd Street, 60th Street and 63rd Street tunnels would generally operate below desirable capacity.

In contrast, the 53rd Street tunnel would operate at, or beyond capacity with V/C ratios as high as 1.17. The least overcrowding results from reverse running (Option 1-2), the Queens Bypass (Option 2-2), or the Port Washington Connection with G service terminated at Court Square (Option 3-3b). The least relief results from the Bypass Connection to the Rockaways (Option 2-4) or the Montauk connection (Option 3-2) and Flushing-related options under certain service strategies in which G service extends to 71st (option 2-8 and 2-9).



7. Queens - Brooklyn (G) Operation. Options that involve the Queens Boulevard Connection require the G service to be turned back at Court Square during peak hours. (The exception, perhaps, is the reverse running, which might allow inbound G service.) The Queens Bypass options enable the G service to begin at 71st Avenue. However, the extension to Rockaways (Option 2-4) provides more relief to the Queens Boulevard line if the number of trains on Queens Boulevard is increased, and the number of trains from the Rockaways is reduced. The Flushing corridor (options 2-8, 2-9, 3-2) and the Montauk (Option 3-2) also require the G line to be cut back to Court Square to allow more trains on Queens Boulevard.

The two options that provide service to the 60th Street tunnel from Flushing (options 1-4 and 1-5) reduce the number of R trains entering Queens Plaza from 14 to 7. This makes it possible for the G trains to operate from the eastbound Queens Plaza track. Running more R trains via 63rd in some of the other options, might also allow this service modification. The point remains, however, that to maximize Manhattan-bound capacity, it is best to modify the G operation in many options.

Costs. The construction costs in 1990 dollars for the various options are summarized in Table 5-4. The key findings are as follows:

1. The Northern Boulevard option (Option 1-1) would cost about \$ 450 million.
2. Options 1-2 through 1-7, which build upon this connection would cost from \$200 million to 500 million more (options 1-4 and 1-6, respectively).
3. The original Queens Bypass Option (Option 2-2) would cost \$ 900 million. Thus, if it were built in lieu of the planned connection, it would cost about \$900 million today. However, building it in addition to the Queens-Northern Boulevard connection would cost 1.3 billion overall. The truncated bypass (Option 2-7) with a connection to the Rockaway Branch would cost \$ 900 million. All other bypass-related options, taken together with the Northern Boulevard connection, would exceed \$ 1 billion.
4. Conversion of the Port Washington Branch to NYCTA operation would cost about \$ 520 million above the costs for the Queens-Northern Boulevard connection.
5. Extension of the LIRR into Manhattan via the lower level of the 63rd Street connection would cost over a billion dollars plus the \$ 450 million cost for the Northern Boulevard connection.

Table 5-4

**Cost Summary of Queens Transit Options  
(In Millions of Dollars)**

| NUMBER | OPTION                                                                                                                                                                                               | Est. Inc.<br>Cost of<br>Option | Est. Cost<br>Northern Blvd<br>Option | TOTAL  |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------|--------|
| 1-1    | 63rd St Local/Express Connection (Northern Boulevard Connection - NBC)                                                                                                                               |                                | \$ 450                               | \$ 450 |
| 1-2    | 3:1 Reverse Signaling<br>- reverse signaling<br>- yard, including connections<br>TOTAL                                                                                                               | \$ 50<br>700<br>750            | 450                                  | 200    |
| 1-3    | 63rd Street GG Connection                                                                                                                                                                            | 250                            | 450                                  | 700    |
| 1-4    | 60th St-IRT Joint Running<br>- structural changes at Queensboro Plaza<br>- storage (east of Main St)<br>- gap problem solution<br>TOTAL                                                              | 75<br>100<br>25<br>200         | 450                                  | 650    |
| 1-5    | 60th St-IRT Joint Running<br>- structural changes at Queensboro Plaza<br>- storage (east of Main St)<br>- gap problem solution<br>- Flushing line relocation<br>TOTAL                                | 25<br>100<br>25<br>125<br>275  | 450                                  | 725    |
| 1-6    | Reversible Fifth Track at Roosevelt Avenue with Rockaway Connection<br>- fifth track (same level)<br>- connection to Rockaway at 63rd Dr (local/exp)<br>- Rockaway extension to Liberty Ave<br>TOTAL | 150<br>200<br>150<br>500       | 450                                  | 950    |
| 1-7    | Revised service pattern at Roosevelt with Rockaway connection<br>- connection to Rockaway Branch at 63rd Dr<br>- Rockaway ext to Liberty Avenue<br>TOTAL                                             | 200<br>150<br>350              | 450                                  | 800    |

|     |                                                                                                                                                                       |                          |        |         |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|---------|
| 2-1 | Single-track bypass (\$660 in 1984 without cars)                                                                                                                      | \$ 850                   | \$ 450 | \$ 1300 |
| 2-2 | Double-track bypass                                                                                                                                                   | 900                      | 450    | 1350    |
| 2-3 | Double-track bypass without 71st                                                                                                                                      | 850                      | 450    | 1300    |
| 2-4 | Bypass (west half) with connection to Rockaway line and JFK spur<br>- bypass (west half)<br>- Rockaway branch to Liberty Avenue<br>- JFK extension<br>TOTAL           | 425<br>175<br>300<br>900 | 450    | 1350    |
| 2-5 | Bypass plus Archer Avenue S.E. Queens extension<br>- bypass<br>- S.E. Queens extension on LIRR tracks<br>TOTAL                                                        | 900<br>200<br>1100       | 450    | 1550    |
| 2-6 | Bypass (west half) with connection to East Central Queens line via L.I.E.<br>- bypass (west half)<br>- L.I.E. subway extension including terminal facilities<br>TOTAL | 400<br>1100<br>1500      | 450    | 1950    |

Table 5-4 (Continued)

| NUMBER | OPTION                                                                                                                             | Est. Inc.<br>Cost of<br>Option  | Est. Cost<br>Northern Blvd<br>Option | TOTAL        |
|--------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------|--------------|
| 2-7    | Truncated Bypass<br>- bypass to Grand Street<br>- GG turnback east of Roosevelt<br>Subtotal<br>- Rockaway branch to Liberty Avenue | 600<br>100<br>700<br>200<br>900 | 0<br>0                               | 700<br>900   |
| 2-8    | LaGuardia Airport extension via Northern Boulevard<br>- if from bellmouth<br>- if from 54th Street (1.5 miles shorter)             | 1200<br>800                     | 450<br>450                           | 1650<br>1250 |
| 2-9    | LaGuardia Airport extension (BQE)<br>- if from bellmouth - underground<br>- if from bellmouth - part elevated                      | 1300<br>750                     |                                      |              |

|     |                                                                                                                                                                                                                            |                           |     |                            |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----|----------------------------|
| 3-1 | LIRR - LI City Transfer<br>(Montauk transfer plan)<br>(\$291 in 1984 without cars)                                                                                                                                         | 400                       | 450 | 850                        |
| 3-2 | 63rd Street connection to Montauk Br<br>(Montauk/Archer plan)<br>(\$381 in 1984 without cars)                                                                                                                              | 550                       | 450 | 1000                       |
| 3-3 | 63rd Street connection to Port Washington branch<br>- 63rd Street connection to Port Washington tracks<br>- conversion of Port Washington line for TA<br>TOTAL                                                             | 250<br>270<br>520         | 450 | 970                        |
| 3-4 | Conversion of a LIRR main line tracks to TA operation                                                                                                                                                                      | OPTION DROPPED            |     |                            |
| 3-5 | LIRR 63rd Street line to GCT<br>- Queens connections (2 tracks* only)<br>plus one of the following<br>1. Grand Central link, or<br>2. 3rd Avenue terminal**<br>3. crosstown (2 tracks) on 50th Street (to 10th Avenue) *** | 600<br>750<br>600<br>1100 | 450 | 1050<br>750<br>600<br>1100 |

NOTE: Costs in 1990 dollars.

° Queens Connection - Two track connection to LIRR instead of formerly proposed four track connection.

°° 3rd Avenue Terminal, 4 track, single level, no tail tracks for storage.

°°° A future second crosstown tunnel for added capacity would add another \$500 million.



Cost Effectiveness. The cost-effectiveness of each option was estimated by comparing the incremental benefits achieved over Option 1-1 with the incremental costs. Benefits were assumed as (1) inbound AM peak-hour use of the 63rd Street tunnel and (2) inbound AM trip reductions in the 53rd Street tunnel. The results are shown in Table 5-5.

- The cost effective options, in terms of using the 63rd Street tunnel include in order of effectiveness (1) Option 1-4 (60th Street trains using Flushing Express track), (2) Option 3-3b (63rd Street tunnel connected to Port Washington Branch), (3) Option 1-5 (60th Street trains using Flushing Express track with Flushing line relocated), and (4) options 2-1, and 2-3 (the Queens Bypass assuming that the Northern Boulevard connection is not built).
- The cost-effective options in terms of affording relief to the 53rd Street tunnel include (1) Option 2-7(a) (63rd Street extension to Grand Avenue in lieu of the Northern Boulevard connection), (2) Option 1-7 (Northern Boulevard connection with express trains skipping Roosevelt Ave (3) 60th Street tunnel service via the Flushing express track, and (4) option 2-1 and 2-3 (the Queens Bypass without the Northern Boulevard connection).

It is clear that, the Queens Bypass fares well in this analysis, on both accounts, if it is built in lieu of the Northern Boulevard connection. With the Northern Boulevard connection, the 60th Street link to the Flushing express track and conversion of the Port Washington line to NYCTA operation both appear cost-effective.

Summary Assessment. Table 5-6 contains a summary assessment of the various options. Based upon this assessment, in conjunction with the cost-effectiveness analysis, the following options should be screened from further consideration:

- Option 1-2 (high costs, adverse impact in off-peak direction)
- Option 1-3 (difficult construction, low ridership)
- Option 2-1 (difficult operations, limited flexibility)
- Option 2-4 (poor cost-effectiveness)
- Option 2-6 (high costs due to difficult subway construction)
- Option 2-7 (not practical, once the Northern Boulevard connection is built)
- Options 2-8 and 2-9 (high cost due to subway construction, little relief, poor cost-effectiveness)

Table 5-5

**Cost Effectiveness of Options Over Option 1-1a**  
(In Millions of Dollars Per Thousand Daily Riders for  
the Inbound AM Peak Hour)

| OPTION | 63rd Street Tunnel |        |      | Reduction in 53rd Street Tunnel |         |      |
|--------|--------------------|--------|------|---------------------------------|---------|------|
|        | Base               | Option | Rank | Base                            | Option  | Rank |
| 1-1    |                    |        |      |                                 |         |      |
| 1-2    | 83.3               |        |      | 187.5                           |         | 9    |
| 1-3    | 50.0               |        | 8    | 125.0                           |         | 5    |
| 1-4    | 25.0               |        | 1    | 100.0                           |         | 3    |
| 1-5    | 34.4               |        | 3    | 136.0                           |         | 7    |
| 1-6    | 71.4               |        |      | 166.7                           |         | 8    |
| 1-7    | 58.3               |        | 10   | 87.5                            |         | 2    |
| 2-1    | 77.3               | (36.4) | 4    | 212.5                           | (100)   | 3    |
| 2-2    | 81.8               | (40.9) | 6    | 225                             | (112.5) |      |
| 2-3    | 77.3               | (36.4) | 4    | 212.5                           | (100)   | 3    |
| 2-4    | 30.0               |        |      | NEGATIVE                        |         |      |
| 2-5    | 91.7               | (54.1) |      | 550                             | (325)   |      |
| 2-6    | 136                |        |      | 750                             |         |      |
| 2-7a   | 50                 |        | 8    | 75                              |         | 1    |
| 2-7abc | 150                |        |      | NEGATIVE                        |         |      |
| 2-8a   | 375                | (300)  |      | NEGATIVE                        |         |      |
| 2-8b   |                    | (100)  |      | 400                             |         |      |
| 2-9    | 250                |        |      | NEGATIVE                        |         |      |
| 3-2a   | 183.3              |        |      | 275                             |         | 10   |
| 3-2b   | 68.7               |        |      | 275                             |         | 10   |
| 3-3a   | 47.3               |        | 7    | NEGATIVE                        |         |      |
| 3-3b   | 30.6               |        | 2    | 130                             |         | 6    |

NOTE: Values in parenthesis assume Northern Boulevard connection is not built.

Table 5-6

## Summary Assessment of Queens-Manhattan Transit Options

| OPTION         | Capital Cost<br>(millions of<br>1990 dollars) | Queens<br>Terminal for<br>G Service | Trains<br>Using<br>63rd St<br>Tunnel | Pass. Using<br>63rd St<br>Tunnel | Relief to<br>53rd St<br>Tunnel | New Subway<br>Trips Across<br>East River | Coverage of New<br>Areas                        | Engineering<br>Implications                | Development<br>Impacts | Institutional<br>Consideration | Remarks                                          |
|----------------|-----------------------------------------------|-------------------------------------|--------------------------------------|----------------------------------|--------------------------------|------------------------------------------|-------------------------------------------------|--------------------------------------------|------------------------|--------------------------------|--------------------------------------------------|
| 1-1 (a)        | \$ 450                                        | Court Sq                            | 14                                   | 16,000                           | 9,000                          | -----                                    |                                                 |                                            |                        |                                |                                                  |
| 1-1 (b)        | 450                                           | Court Sq                            | 14                                   | 21,000                           | 10,000                         | -----                                    |                                                 |                                            |                        |                                |                                                  |
| 1-2            | 1200                                          | 71st Ave                            | 21                                   | 25,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                | Adverse<br>operation in<br>off-peak<br>direction |
| 1-3            | 700                                           | Manhattan                           | 21                                   | 21,000                           | 11,000                         | 2,000                                    | Direct service<br>North Brooklyn -<br>Manhattan | very difficult<br>construction             | North<br>Brooklyn      |                                | not practical                                    |
| 1-4            | 650                                           | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 2,000                                    |                                                 | requires<br>special cars                   |                        |                                |                                                  |
| 1-5            | 725                                           | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 2,000                                    |                                                 |                                            | Sunnyside<br>Yard      |                                | eliminates<br>Queensboro<br>Plaza transfer       |
| 1-6            | 950                                           | Court Sq                            | 21                                   | 23,000                           | 12,000                         | 3,000                                    | Direct service -<br>Rockaways                   | disrupts<br>service during<br>construction |                        |                                |                                                  |
| 1-7            | 800                                           | Court Sq                            | 21                                   | 22,000                           | 13,000                         | 3,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-1            | 1300                                          | 71st Ave                            | 21                                   | 27,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                | operationally<br>not practical                   |
| 2-2            | 1350 <sup>1</sup>                             | 71st Ave                            | 21                                   | 27,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-3            | 1300                                          | 71st Ave                            | 21                                   | 27,000                           | 13,000                         | 4,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-4            | 1350                                          | 71st Ave                            | 21                                   | 19,000                           | 7,000                          | 4,000                                    | direct service<br>JFK/Rockaways                 |                                            |                        |                                |                                                  |
| 2-5            | 1550                                          | 71st Ave                            | 21                                   | 28,000                           | 11,000                         | 10,000                                   | Southeast Queens                                |                                            |                        |                                |                                                  |
| 2-6            | 1950                                          | 71st Ave                            | 21                                   | 27,000                           | 11,000                         | 7,000                                    | Eastern Queens                                  |                                            |                        |                                |                                                  |
| 2-7 (a)        | 6000 <sup>2</sup>                             | Court Sq                            | 14                                   | 19,000                           | 11,000                         | -----                                    |                                                 |                                            |                        |                                |                                                  |
| 2-7<br>(a,b,c) | 900                                           | Grand Ave                           | 14                                   | 19,000                           | 9,000                          | 3,000                                    | direct service -<br>Rockaways                   |                                            |                        |                                |                                                  |
| 2-8 (a)        | 1650                                          | 71st Ave                            | 14                                   | 20,000                           | 7,000                          | 4,000                                    | Jackson Hgts -<br>LaGuardia                     |                                            |                        |                                |                                                  |
| 2-8 (b)        | 1250                                          | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 5,000                                    |                                                 |                                            |                        |                                |                                                  |
| 2-9            | 1200                                          | Court Sq                            | 21                                   | 19,000                           | 9,000                          | 3,000                                    | LaGuardia                                       |                                            |                        |                                |                                                  |



Table 5-6 (Continued)

| OPTION  | Capital Cost<br>(millions of<br>1990 dollars) | Queens<br>Terminal for<br>G Service | Trains<br>Using<br>63rd St<br>Tunnel | Pass. Using<br>63rd St<br>Tunnel | Relief to<br>53rd St<br>Tunnel | New Subway<br>Trips Across<br>East River | Coverage of New<br>Areas                     | Engineering<br>Implications | Development<br>Impacts | Institutional<br>Consideration                   | Remarks                                                   |
|---------|-----------------------------------------------|-------------------------------------|--------------------------------------|----------------------------------|--------------------------------|------------------------------------------|----------------------------------------------|-----------------------------|------------------------|--------------------------------------------------|-----------------------------------------------------------|
| 3-1     | 850                                           | Court Sq                            | 14                                   | (4)                              | (4)                            | (4)                                      |                                              |                             |                        | yes                                              | poor<br>passenger<br>attraction                           |
| 3-2 (a) | 1000                                          | 71st Ave                            | 21                                   | 19,000                           | 7,000                          | 5,000                                    | Richmond Hill,<br>Glendale,<br>Maspeth       |                             |                        | community<br>objects to plan                     | impacts LIRR<br>freight service                           |
| 3-2 (b) | 1000                                          | Court Sq                            | 21                                   | 24,000                           | 11,000                         | 5,000                                    |                                              |                             |                        |                                                  |                                                           |
| 3-3 (a) | 970                                           | 71st Ave                            | 21                                   | 27,000                           | 7,000                          | 10,000                                   | Bayside / Great<br>Neck                      |                             |                        | yes                                              | allows 7 more<br>peak hour<br>trains into<br>Penn Station |
| 3-3 (b) | 970                                           | Court Sq                            | 28                                   | 33,000                           | 13,000                         | 10,000                                   |                                              |                             |                        | yes                                              |                                                           |
| 3-4     | -----                                         | Court Sq                            | 14                                   | (4)                              | (4)                            | (4)                                      | requires major<br>construction in<br>Jamaica |                             |                        | possibly                                         | not practical -<br>limits LIRR<br>capacity at<br>Jamaica  |
| 3-5     | 1650 <sup>3</sup>                             | Court Sq                            | 14                                   | (4)                              | (4)                            | (4)                                      | very costly<br>construction                  |                             | Midtown                | may allow<br>benefit-<br>assessment<br>financing | very long<br>range                                        |

<sup>1</sup> 900 without Northern Boulevard connection.<sup>2</sup> without Northern Boulevard connection.<sup>3</sup> to 3rd Avenue terminal, to Grand Central Terminal.

(4) Not estimated.

- Option 3-1 (high cost and little relief, nullified by 63rd Street - Queens Boulevard connection)
- Option 3-2 (community concerns, little additional relief over Queens Boulevard connection)
- Option 3-4 (not operable in Jamaica)

### C. SUGGESTED DIRECTIONS

The analyses in this chapter reaffirms the desirability of building the Queens Bypass. The bypass provides effective relief to the Queens Boulevard corridor, achieves good use of the 63rd Street tunnel, enables the Queens-Brooklyn service to continue operating to and from 71st Avenue, and makes it possible to extend services to eastern and Southeastern Queens as demands arise and resources permit.

However, to build both the Bypass and the Northern Boulevard connection would result in some redundant investments. The complete Bypass makes sense only if the planned Northern Boulevard connection is not built. Developing it at this time would add to delays, and costs, and community credibility and is not desirable.

Accordingly, the following sequence of actions should be taken over the next 10 to 15 years.

1. The Northern Boulevard express-local connection should be completed as soon as possible (Option 1-1).
2. The 60th Street tunnel should be connected to the express track of the Flushing line; and a car capable of operating on both IRT and BMT tracks should be utilized (Option 1-4).
3. The next step would be to add a fifth track through the Roosevelt Avenue station, and to build a connection between the Queens Boulevard and Rockaway lines (Option 1-7).

If options 1-4 and 1-7 prove unacceptable to the NYCTA, then the Port Washington line should be converted to NYCTA operation, and routed via the 63rd Street tunnel.

A connection between the Long Island Rail Road main-line and the 63rd Street tunnel, and an extension of LIRR service to midtown Manhattan has meant over the long run as part of regional express transit improvements (Option 3-5). This tunnel connection should initially terminate on 3rd Avenue and about 50th Street, with provision for ultimate extension across Manhattan and into New Jersey. The chapter that follows further describes this transit improvement program.

## CHAPTER 6

### TRANSIT IMPROVEMENT PROGRAM

This chapter sets forth the recommended transit improvement program for the Queens - Manhattan corridor. It describes the components of this program, indicates their timing, identifies costs, and suggest financing mechanisms.

The recommended program is keyed to the needs in the Queens-Manhattan corridor over the next 25 years, and to the resources that are likely to be available. It reflects political and financial realities. At the same time, it recognizes that better public transportation has been the key to New York City's growth and development. Therefore, it contains several bold proposals as well.

#### A. PROGRAM FEATURES

The recommended transit improvement program is shown in Figure 6-1 and Table 6-1. It contains a coordinated group of short and long range actions that are designed to: (1) alleviate peak-hour overcrowding on existing subway and railroad lines; (2) make effective use of the 63rd Street tunnel; (3) improve connectivity between public transport services, and (4) serve new markets. It balances vision with reality.

This program has been developed on the basis that the planned 63rd Street tunnel connection to Northern Boulevard will be built. Thus, the Queens Bypass, despite its transportation merits, has not been incorporated into the plan.

Early Action 1990-1995. Several early action improvements should be implemented in the next few years to provide transportation benefits during the period that the Northern Boulevard connection is being built.

- 1-1 New Subway Cars. Sixty-foot cars should be used on the E and F Queens Boulevard express trains. This will help reduce dwell times at busy stations such as Roosevelt Avenue and Queens Plaza, and make it possible to consistently operate 30 trains per track per hour.
- 1-2 Faster J - Z Service. Service on the Broadway-Jamaica line should be speeded up by consolidating or closing lightly-used closely spread stations. The existing skip-stop operations should be retained. The Bowery, Alabama, and Cypress stations should be closed. It is also desirable to close the Cleveland, 85th-Forest Parkway, 102nd and 121st Street stations. These closures will dramatically improve the attractiveness of the J-Z service with minimum adverse affect on existing riders.



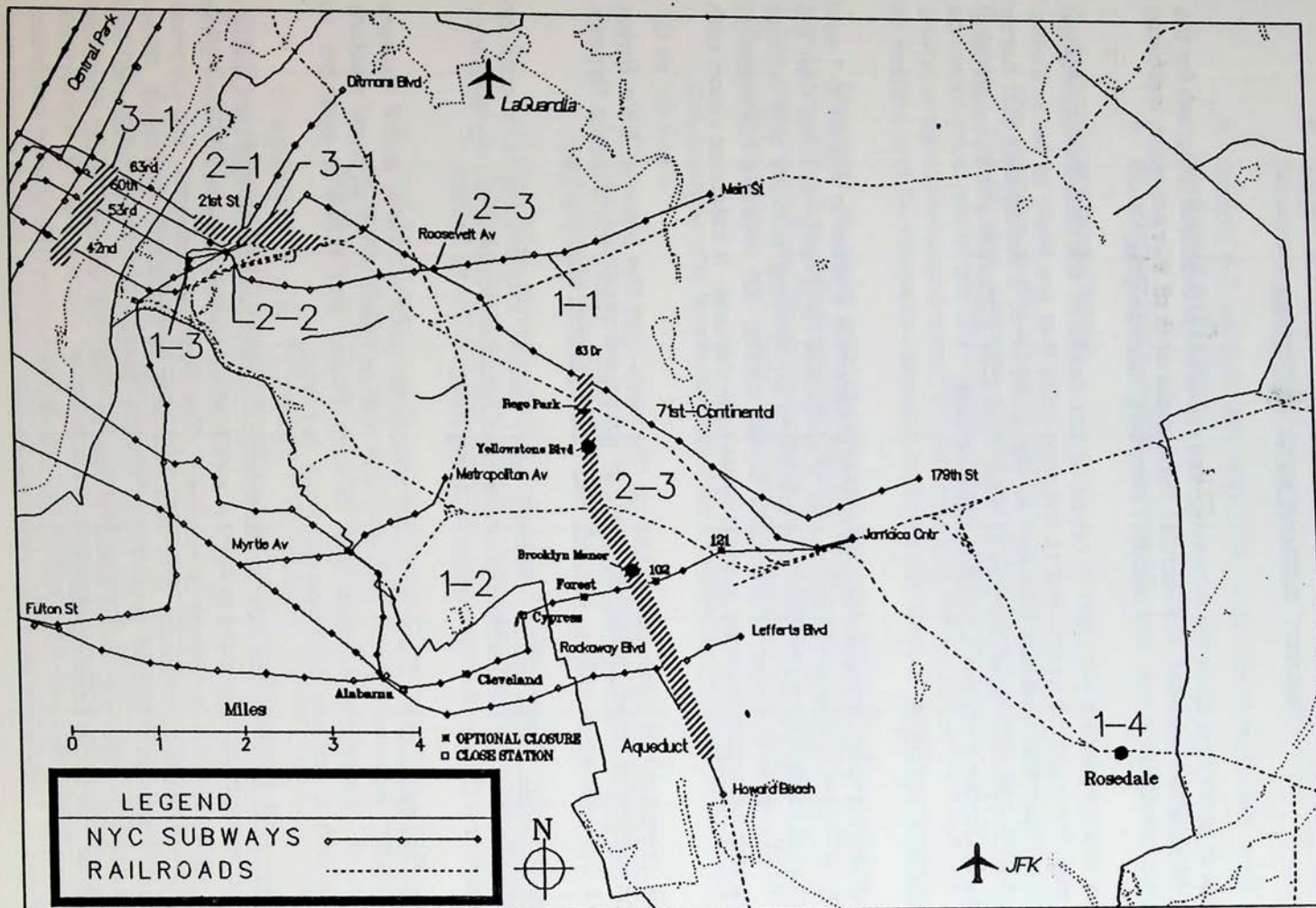


Figure 6-1

## Queens-Manhattan Transit Development Program

**Table 6-1**

**Queens-Manhattan  
Transit Improvement Program**

| <b>Stage 1     1990 - 1995</b> |                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-1                            | Operate 60-foot cars on Queens Boulevard line                                                                                                                                  |
| 1-2                            | Speed up J-Z service by station consolidation/closures                                                                                                                         |
| 1-3                            | Improve pedestrian connections in Long Island City                                                                                                                             |
| 1-4                            | Develop Rosedale Transit Center                                                                                                                                                |
| <b>Stage 2     1995 - 2005</b> |                                                                                                                                                                                |
| 2-1                            | Build Queens-Northern Boulevard express-local connection                                                                                                                       |
| 2-2                            | Connect 60th Street tunnel (at Queensboro Plaza) to Flushing line express track                                                                                                |
| 2-3                            | Provide 5th track at Roosevelt Avenue with connection to Rockaway line                                                                                                         |
| <b>Stage 3     Post 2005</b>   |                                                                                                                                                                                |
| 3-1                            | Connection 60th Street lower level to LIRR and provide 3rd Avenue station in Manhattan. (Ultimately extend across Manhattan and Hudson River as part of regional rail system.) |

1-3 Improved Pedestrian Connections. Passenger connectivity should be improved in the Long Island City area. (a) A pedestrian connection should be built between the IND Queens Plaza station and the elevated IRT/BMT Queensboro Plaza station. This connection provides an alternative to the Roosevelt Avenue transfer in Jackson Heights. (b) A pedestrian connection should be built between the elevated IRT Courthouse Square station and the underground IND Court Square station. This connection should be implemented by Citicorp as it proceeds with its Phase II development.

1-4 Rosedale Transit Center. A transit center should be developed at the Rosedale station of the Long Island Rail Road. The center should be modestly designed; it should contain canopies, shelters, and enclosed waiting areas, and improved/expanded parking facilities. NYCTA and Nassau local and express routes should serve the station.

Stage II Improvements. The following two improvements should be implemented by about 2005.

2-1 Northern Boulevard Connection. The express-local connection should be built between the 63rd Street tunnel and Northern Boulevard. This connection will make it possible to operate 14 trains into Manhattan during the AM peak hour. This improvement, which would cost about \$450 million, should be completed around 1995.

2-2 60th Street-Flushing Line Connection. The 60th Street tunnel tracks at Queensboro Plaza should be extended to connect with the Flushing line express track west of 33rd Avenue. This will make it possible to route a portion of the R service via the Flushing express track, and operate an additional 7 peak hour trains (into Manhattan) via 63rd Street resulting in 21 trains using the 63rd Street tunnel. It would increase the capacity of the Flushing line, thereby avoiding the overloads that are anticipated by about 2000. This improvement, which would cost about \$200 million should be implemented by about 2,000.

2-3 Roosevelt Avenue Fifth Track. A fifth reversible express track should be provided at Roosevelt Avenue to increase the capacity of the express service from about 28 to 35 trains per hour. A connection between the Queens Boulevard express tracks and a reactivated Rockaway line at about 63rd Drive would allow direct express service from the Rockaways to Midtown via the 63rd Street tunnel.

This project, in conjunction with the 60th Street-Flushing connection would result in 28 trains entering Manhattan via the 63rd Street tunnel in the morning peak hour, thereby achieving full use of the tunnel, and allowing both 6th and 7th Avenue access to Manhattan. This project, which would cost about \$500 million, should be implemented, as needed, by about 2005 to 2010.



The three intermediate-range projects represent an incremental approach to providing better subway service to Eastern Queens: (1) They permit full use of the 63rd Street tunnel, with substantial relief to 53rd Street, (2) they provide additional capacity to Northern, Central, and Eastern Queens, (3) they penetrate new markets (i.e. Rego Park), and (4) they provide faster service to Rockaways.

Tables 6-2 gives an illustrative service plan, assuming that the three projects are implemented. Service could be further improved if the 2nd Avenue subway were completed, at least south of 63rd Street.

Projects 2-2 and 2-3 contain some innovative operating concepts. If these concepts prove unacceptable to the NYCTA and MTA, then an alternative subway improvement concept should be implemented. This alternate concept involves converting the Port Washington Branch of the LIRR to NYCTA operation. Fourteen subway trains would operate to and from Manhattan via the 63rd Street tunnel, 7 express from Great Neck, and 7 local from Little Neck. This project would cost about \$520 million.

Future Development - Post 2005. The lower level of the 63rd Street tunnel ultimately should be connected to the Long Island Rail Road in Queens and to Midtown Manhattan. A four stage development concept should be considered: (1) initial development of a 4-track station on 2nd or 3rd Avenue in Manhattan, (2) a two-track crosstown line in about 50th Street, (3) a second two-track crosstown line in about 49th Street, and (4) a two-track tunnel under the Hudson River to connect with New Jersey Transit electrified lines.

This is a costly concept that should be undertaken as part of a bi-state commuter rail service improvement plan. Because of the benefits conferred to Midtown, part of the costs should be borne by the benefitted properties in Midtown Manhattan.

Corollary Improvements. The proposed improvements plan emphasizes NYCTA subway service improvements. There remains a need to improve rail access to the eastern Queens. It is clear from an analysis of the various improvement options that altering the LIRR or building new subway lines paralleling the LIRR is a very costly proposition -one that could consume capital funds that better might be used elsewhere. Yet the LIRR penetrates several areas of Queens that are not directly served by the subway system. The Port Washington line serves a busy corridor in northeastern Queens. The LIRR Main line serves eastern Queens (Queens Village), and the Atlantic and Montauk branches serve southeastern Queens. These four branches have sixteen stations in outer Queens. Even the western Montauk line along Newton Creek serves a residential/industrial area that is not well served by subway.

Table 6-2

Illustrative Service Plan - Intermediate Development  
(Inbound AM Peak Hour)

| LINE             | QUEENS           |               |                                  | RIVER<br>CROSSING | PEAK<br>TRAINS | MANHATTAN ROUTE                | OTHER TERMINAL                        |
|------------------|------------------|---------------|----------------------------------|-------------------|----------------|--------------------------------|---------------------------------------|
|                  | TERMINAL         | ROUTE         | SERVICE                          |                   |                |                                |                                       |
| V/Q <sup>1</sup> | 179TH            | Queens Blvd   | Local                            | 63rd              | 14             | 6th Ave local/exp <sup>1</sup> | Brighton Beach via Brighton express   |
| W                | 71ST             | Queens Blvd   | Local                            | 63rd              | 7              | Broadway exp<br>(via tunnel)   | 95th St via 4th Ave local             |
| X                | Rockaway Pk      | Queens Blvd   | Local                            | 63rd              | 7              | 6th Ave express                | Bergen St or 2nd Ave                  |
| U/8              | Main St Flushing | Flushing      | Express                          | 60th              | 7              | Broadway local                 | Whitehall St                          |
| R                | 71st             | Queens Blvd   | Local                            | 60th              | 7              | Broadway local                 | 95th St via 4th Ave local             |
| N                | Ditmars Blvd     | Astoria       | Local                            | 60th              | 14             | Broadway express               | Coney Island via Sea Beach express    |
| E                | Jamaica Blvd     | Queens Blvd   | Express                          | 53rd              | 14             | 8th Ave local                  | World Trade Center                    |
| F                | 179th            | Queens Blvd   | Express (skips<br>Roosevelt Ave) | 53rd              | 14             | 6th Ave local                  | Coney Island/Bay Pkwy via Culver Line |
| 7                | Main St Flushing | Roosevelt Ave | Local                            | 42nd              | 14             | 42nd St                        | Times Square                          |
| 7                | Main St Flushing | Roosevelt Ave | Express                          | 42nd              | 14             | 42nd St                        | Times Square                          |
| G                | Court Square     | Queens-Bklyn  | Local                            | ---               | 6              | ---                            | Smith - 9th streets                   |

NOTES:

<sup>1</sup> Q trains would operate via 6th Avenue express track to Brighton Beach. B via 6th Avenue express if Q is routed to Upper Manhattan. V trains would operate via 6th Avenue local track to 2nd Avenue.

<sup>2</sup> Alternate: W and R service could be routed via N line and Broadway express while N service could be routed via R line and Broadway local.

This analysis suggests better adapting the LIRR to serve these markets. There is little merit in building new tracks (or re-equipping existing tracks for a different kind of operation) at high cost if the existing lines can be used more effectively. The MTA was created a quarter century ago to establish a regional transportation policy and coordinate transportation.

An alternative to costly capital expenditures is to let the LIRR provide improved service. A Southeast Queens TA line, for example, would not only require a large capital outlay, but the TA line would have to increase its operating budget to run it.

## **B. ACHIEVING THE PLAN**

The recommended improvement plan shows how Queens-Manhattan Transit service can be improved in the coming decades. But the plan is only a starting point - the task ahead is making this plan a reality as quickly as possible. This calls for achieving consensus on the early action proposals, and finding the means to implement them as soon as possible. It calls for moving ahead with the planned Northern Boulevard connection. And it calls for dedicating needed funding for subsequent subway improvements over the next twenty years.

Good public transportation, subways and commuter rail in particular, have made New York City, especially Manhattan, what it is today. Continued investment in public transport infrastructure, especially in the Queens-Manhattan corridor, is essential in the years ahead. This is the challenge that must be realized.





## LONG ISLAND CITY SITE POPULATION AND RIDERSHIP ANALYSIS

## SITE POPULATION AND RIDERSHIP ANALYSIS

## SITE POPULATION AND RIDERSHIP ANALYSIS

## APPENDIX A

CONFIDENTIAL

STATE OF TEXAS, COUNTY OF DALLAS



Table A-1

## Anticipated Population for Planned Long Island City Developments

| DEVELOPMENTS                             | SIZE<br>(millions of<br>sq.ft.) | EMPLOYMENT <sup>a</sup> | RESIDENTIAL<br>POPULATION <sup>b</sup> | SHOPPERS/<br>VISITORS <sup>c</sup> |
|------------------------------------------|---------------------------------|-------------------------|----------------------------------------|------------------------------------|
| Hunters Point<br>Waterfront              | 4.0                             | 14,000                  | 10,000                                 | 10,000 <sup>a</sup>                |
| Office                                   | 1.0                             | 1,000                   |                                        |                                    |
| Commercial                               | 5.0                             |                         |                                        |                                    |
| Residential                              |                                 |                         |                                        |                                    |
| Court Square (office)                    | 1.8                             | 6,300                   | ---                                    | ---                                |
| International Design<br>Center Expansion | 1.3                             | 4,550                   | ---                                    | ---                                |
| Riverfront East                          |                                 |                         |                                        |                                    |
| Office                                   | 0.7                             | 2,450                   | ---                                    | ---                                |
| Residential                              | 1.0                             | ---                     | 2,000                                  | ---                                |
| PDC Development                          | NA                              | NA                      | ---                                    | ---                                |
| Queens Plaza                             |                                 |                         |                                        |                                    |
| Market Place (Office)                    | 2.0                             | 7,000                   | ---                                    | ---                                |
| Sunnyside Yards<br>(Office)              | 5.0                             | 17,500                  | ---                                    | ---                                |
| TOTAL Office                             | 14.8                            | 52,800                  | ---                                    | ---                                |
| Commercial                               | 1.0                             | 1,00                    | 12,000                                 | 10,000                             |
| Residential                              | 6.0                             | ---                     | ---                                    | ---                                |
| ALL                                      | 21.8                            | 53,800                  | ---                                    | ---                                |

Note: <sup>a</sup> at 3.5/1000 sq.ft.<sup>b</sup> at 500 sq.ft./person<sup>c</sup> primary destinations at 10/1000sq.ft.

Source: Information obtained by Urbitran from Public Development Corporation.

Table A-2

Trip Generation Factors for Proposed Long Island City Development

| USE                            | AM   |      | PM   |      |
|--------------------------------|------|------|------|------|
|                                | IN   | OUT  | IN   | OUT  |
| Office<br>(per employee)       | 0.40 | 0.05 | 0.10 | 0.30 |
| Residential<br>(per resident)  | 0.05 | 0.40 | 0.35 | 0.10 |
| Commercial<br>(per 000 sq.ft.) | ---  | ---  | 0.10 | 0.10 |

Note: Office factor assumes:

- 80% of employment on site on any given day of which 50% arrives in AM peak hour and 37.5% depart in PM peak hour.
- PM 15% loss.

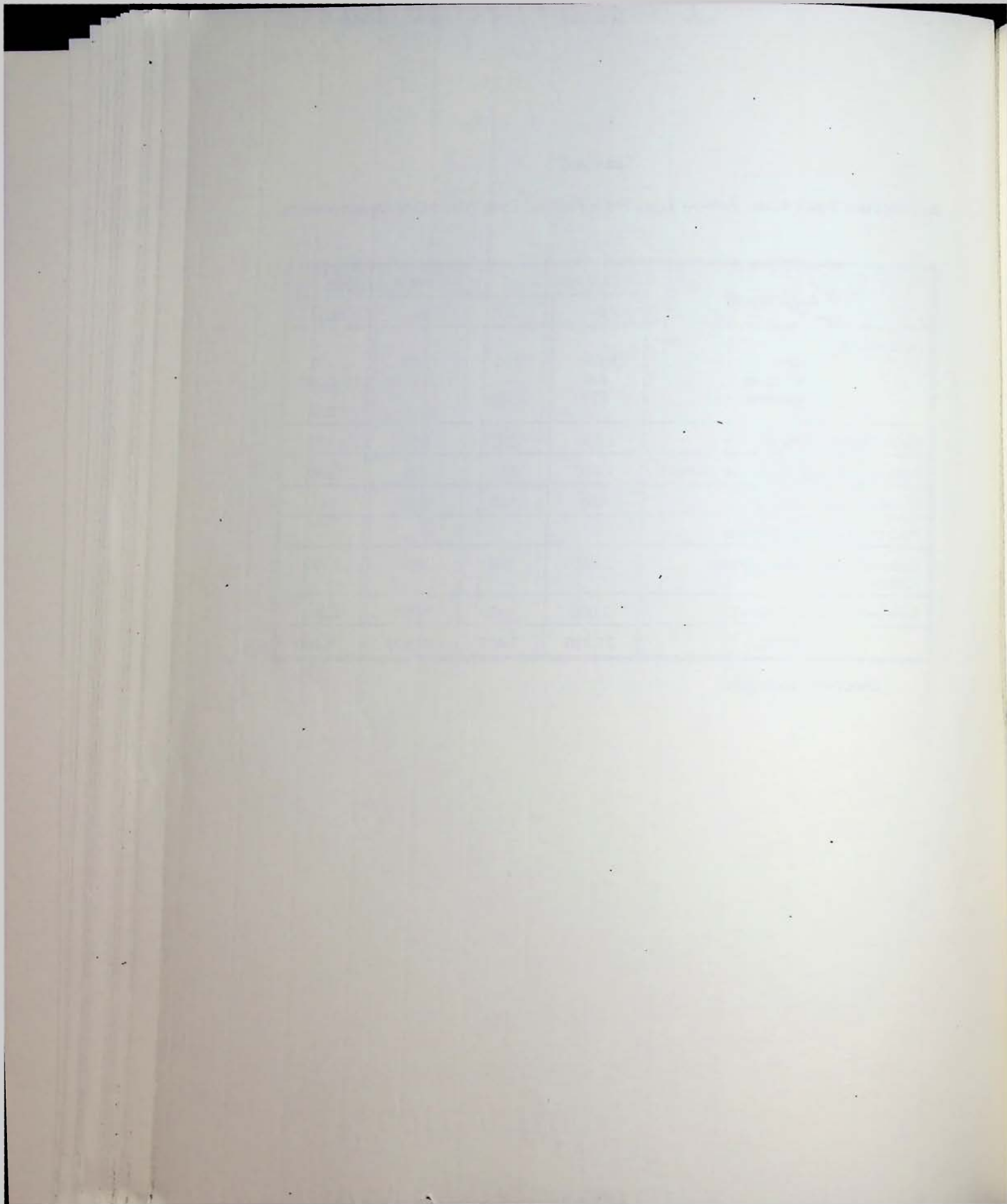
Table A-3

Anticipated Peak Hour Person Trips From Planned Long Island City Developments

| DEVELOPMENTS                         | AM PEAK HOUR |       | PM PEAK HOUR |          |
|--------------------------------------|--------------|-------|--------------|----------|
|                                      | IN           | OUT   | IN           | OUT      |
| Hunters Point                        |              |       |              |          |
| Office                               | 5,600        | 700   | 1,400        | 4,200    |
| Commercial                           | 400          | ---   | 1,000/100    | 1000/300 |
| Residential                          | 500          | 4,000 | 3,500        | 1000     |
| Court Square (Office)                | 2,520        | 320   | 640          | 1,890    |
| International Design Center (Office) | 1,820        | 230   | 460          | 1,580    |
| Riverfront East (Office)             | 980          | 120   | 240          | 740      |
| PDC Development (Office)             |              |       |              |          |
| Queens Plaza - Market Place (Office) | 2,800        | 350   | 700          | 2,100    |
| Sunnyside Yards (Office)             | 7,000        | 880   | 1,760        | 5,250    |
| TOTAL                                | 21,720       | 7,400 | 10,500       | 18,260   |

\* Shoppers/Employees.





## APPENDIX B

### SUBWAY STATION BOARDINGS AND RIDERSHIP

## APPENDIX 8

STATIONARY BOARDS AND ROOSTS



Table B-1

## 1988 Passenger Boardings

| Station            | AM Peak Hour        |                     | 24 - Hour |                      |
|--------------------|---------------------|---------------------|-----------|----------------------|
|                    | 1988                | March 1990          | 1988      | September 1990       |
| 179th Jamaica      | 12,904              | 11,399              | 36,376    | 28,795               |
| 169                | 5,300               | 1,770               | 20,940    | 7,448                |
| Parsons            | 4,047               | 2,096               | 20,181    | 8,770                |
| Sutphin            | 2,765               | 508                 | 12,559    | 3,508                |
| Van Wyck           | 1,996               | 1,700               | 6,356     | 3,959                |
| Subtotal           | 26,202              | 17,473              | 96,412    | 52,078               |
| Jamaica Center     |                     | 3,730. <sup>a</sup> |           | 17,176. <sup>b</sup> |
| Sutphin            |                     | 1,500               |           | 8,490. <sup>b</sup>  |
| Jamaica - Van Wyck |                     | 980                 |           | 3,452                |
| Subtotal           |                     | 6210                |           | 29,118               |
| Union              | 4,959               |                     | 21,483    |                      |
| 75th               | 708                 |                     | 2,816     |                      |
| 71st - Continental | 5,494               |                     | 22,495    |                      |
| Subtotal           | 11,161              |                     | 46,794    |                      |
| 67                 | 2,186               |                     | 7,437     |                      |
| 63                 | 2,787               |                     | 11,496    |                      |
| Woodhaven          | 3,732               |                     | 16,278    |                      |
| Grand              | 2,346               |                     | 7,920     |                      |
| Elmhurst           | 1,743               |                     |           |                      |
| Subtotal           | 12,794              |                     | 52,349    |                      |
| Roosevelt          | 5,200               |                     | 25,406    |                      |
| 65                 | 587                 |                     | 2,531     |                      |
| Northern           | 945                 |                     | 4,468     |                      |
| 46                 | 1,802               |                     | 7,775     |                      |
| Steinway           | 1,861               |                     | 9,880     |                      |
| 36                 | 165. <sup>b</sup>   |                     | 3,260     |                      |
| Subtotal           | 5,360               |                     | 27,914    |                      |
| Queens Boulevard   | 1,441. <sup>c</sup> |                     | 12,994    |                      |
| 23rd Ely           | 471. <sup>a</sup>   |                     | 5,348     |                      |
| Subtotal           | 1,912               |                     | 18,312    |                      |
| TOTAL              | 62,629              |                     | 267,187   |                      |

<sup>a</sup> 1051 peak entries in PM.<sup>b</sup> 1103 peak entries in PM.<sup>c</sup> 1903 peak entries in PM.

Total Boardings 4,768; 3,730 assigned to E trains.

Table B-2

Station-to-Station. March 1990 Subway Volume by Route. 8-9AM. Westbound.

| Route                | From           | To                            | Volume              |
|----------------------|----------------|-------------------------------|---------------------|
| E                    | Jamaica Center | Sutphin                       | 3,730. <sup>a</sup> |
|                      | Sutphin        | Van                           | 5,230. <sup>b</sup> |
|                      | Van Wyck       | Wyck/Jamaica<br>Jamaica/Union | 6,210. <sup>b</sup> |
| F                    | 179th          | Parsons                       | 11,000              |
|                      | Parsons        | Union Trk                     | 14,075              |
| R                    | 179th          | 169                           | 400                 |
|                      | 169            | Parsons                       | 2,170               |
|                      | Parsons        | Sutphin                       | 1,800               |
|                      | Sutphin        | Van Wyck                      | 2,300               |
|                      | Van Wyck       | Union                         | 3,400               |
| TOTAL TO UNION TRK   |                |                               | 23,685              |
| Estimate, March 1989 |                |                               | 31,512              |

<sup>a</sup> 80% of 4660 boardings.

<sup>b</sup> excludes back tracking via J line - about 800 to 1000 passengers.

Source: NYCTA counts.

Table B-2

Station-to-Station. March 1990 Subway Volume by Route. 8-9AM. Westbound.

| Route                | From           | To                            | Volume              |
|----------------------|----------------|-------------------------------|---------------------|
| E                    | Jamaica Center | Sutphin                       | 3,730. <sup>a</sup> |
|                      | Sutphin        | Van                           | 5,230. <sup>b</sup> |
|                      | Van Wyck       | Wyck/Jamaica<br>Jamaica/Union | 6,210. <sup>b</sup> |
| F                    | 179th          | Parsons                       | 11,000              |
|                      | Parsons        | Union Trk                     | 14,075              |
| R                    | 179th          | 169                           | 400                 |
|                      | 169            | Parsons                       | 2,170               |
|                      | Parsons        | Sutphin                       | 1,800               |
|                      | Sutphin        | Van Wyck                      | 2,300               |
|                      | Van Wyck       | Union                         | 3,400               |
| TOTAL TO UNION TRK   |                |                               | 23,685              |
| Estimate, March 1989 |                |                               | 31,512              |

<sup>a</sup> 80% of 4660 boardings.

<sup>b</sup> excludes back tracking via J line - about 800 to 1000 passengers.

Source: NYCTA counts.





**TABLE 3-5**

**Analysis of Candidate Station for Closure (Broadway-Jamaica Line)**

| Estimate AM Peak<br>Hour Boarding<br>Passengers | Estimate Daily Boarding Passenger               |                                                |                                |
|-------------------------------------------------|-------------------------------------------------|------------------------------------------------|--------------------------------|
|                                                 | < 1000                                          | 1000 - 1500                                    | over 1500                      |
| < 250                                           | Cypress Hills<br>Alabama<br>Bowery <sup>1</sup> |                                                |                                |
| 250 - 500                                       |                                                 | 121<br>111<br>104 -102<br>85<br>75<br>Chauncey | Cleveland<br>Hewes<br>Flushing |

<sup>1</sup> based on PM boardings.

TABLE 3-6

**Potential Peak Hour Service Patterns with Stations Closed  
(Broadway - Jamaica Line)**

|                             | Minimum<br>Closure<br>Skip-Stop | Additional |                      | Closures                      |
|-----------------------------|---------------------------------|------------|----------------------|-------------------------------|
|                             |                                 | Skip-Stop  | Exp/Local<br>Jamaica | Exp Jamaica<br>Local Canarsie |
| Jamaica Center              | J,Z                             | J,Z        | J,Z                  | J                             |
| Sutphin                     | J,Z                             | J,Z        | J,Z                  | J                             |
| 121st                       | Z                               | Closed     | Closed               | Closed                        |
| 111th                       | J                               | J          | J                    | J                             |
| 104th-102nd                 | Z                               | Closed     | Closed               | Closed                        |
| Woodhaven                   | J,Z                             | J,Z        | J,Z                  | J                             |
| 85th-Forest                 | J                               | Closed     | Closed               | Closed                        |
| 75th-Elderts                | Z                               | Z          | J                    | J                             |
| Cypress Hills               | Closed                          | Closed     | Closed               | Closed                        |
| Crescent                    | J,Z                             | J,Z        | J,Z                  | J                             |
| Norwood                     | J                               | J          | J                    | J                             |
| Cleveland                   | Z                               | Closed     | Closed               | Closed                        |
| Van Sicklen                 | J                               | Z          | J                    | J                             |
| Alabama                     | Closed                          | Closed     | Closed               | Closed                        |
| Broadway-Eastern Pkwy       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Chauncey                    | Z                               | J          | J                    | K                             |
| Halsey                      | J                               | Z          | J                    | K                             |
| Bates                       | Z                               | J          | J                    | K                             |
| Kosciusko                   | J                               | Z          | J                    | K                             |
| Myrtle                      | J,Z                             | J,Z        | J                    | K                             |
| Flushing                    | --                              | --         | --                   | K                             |
| Lorimer                     | --                              | --         | --                   | K                             |
| Hewes                       | --                              | --         | --                   | K                             |
| Marcy                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Essex                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Bowery                      | Closed                          | Closed     | Closed               | Closed                        |
| Canal                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Chambers                    | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Fulton                      | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Broad                       | J,Z                             | J,Z        | J,Z                  | J,K                           |
| Stations Closed             | 3                               | 7          | 7                    | 7                             |
| Stops Reduced (per service) | 1                               | 3          | -1 (J) / 8 (Z)       | 4 (J)                         |

K would begin at Eastern Pkwy. or Rockaway Pkwy. It would operate to Broad Street or via 6th Avenue to Midtown.



Table 4-3

Year 2000 AM Peak Hour Inbound Riders Across East River  
Option 1-1: 63rd Street Tunnel - Express Local Connection

| TUNNEL      | SERVICE  | 2000<br>DEMAND<br>EXISTING<br>SERVICE <sup>1</sup> | OPTION      |        |          |                     |              |
|-------------|----------|----------------------------------------------------|-------------|--------|----------|---------------------|--------------|
|             |          |                                                    | SERVICE     | TRAINS | CAPACITY | ESTIMATED<br>RIDERS | V/C<br>RATIO |
| 63rd        | Q        | 3000                                               | V/Q         | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 3000                                               | subtotal    | 14     | 19,600   | 16,000              | 0.82         |
| 60th        | N        | 18,000                                             | N           | 14     | 19,600   | 18,000              | 0.92         |
|             | R        | 18,000                                             | R           | 14     | 19,600   | 16,000              | 0.82         |
|             | subtotal | 36,000                                             | subtotal    | 28     | 39,200   | 34,000              | 0.87         |
| 53rd        | E        | 26,500                                             | E           | 14     | 19,600   | 22,000              | 1.12         |
|             | F        | 26,500                                             | F           | 14     | 19,600   | 22,000              | 1.12         |
|             | subtotal | 53,000                                             | subtotal    | 28     | 39,200   | 44,000              | 1.12         |
| 42nd        | 7        | 38,000                                             | 7           | 28     | 33,880   | 36,000              | 1.06         |
|             | subtotal | 38,000                                             | subtotal    | 28     | 33,880   | 36,000              | 1.06         |
| GRAND TOTAL |          | 130,000                                            | Grand Total | 98     | 131,880  | 130,000             | 0.99         |

<sup>1</sup> Capacity assumed at 1400/train for IND-BMT division and 1210/train for IRT.

Source: Data rounded from Table 2-12, 63rd Street increased to 3000.

